FCC Test Report

Report No.: AGC02866150301FE03

FCC ID	:	2AEJ9FREEDOM
APPLICATION PURPOSE	:	Original Equipment
PRODUCT DESIGNATION	:	GSM/WCDMA Mobile Phone
BRAND NAME	:	N/A
MODEL NAME	:	Freedom
CLIENT	:	Digit Secure India Private Limited
DATE OF ISSUE	:	Apr.24, 2015
STANDARD(S) **TEST PROCEDURE(S)**	:	FCC Part 15 Rules DA 00-705
REPORT VERSION	:	V1.0

Attestation of ***G***lobal ***C***ompliance (Shenzhen) Co., Ltd

Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Apr.24, 2015	Valid	Original Report

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1. VERIFICATION OF CONFORMITY

Applicant	Digit Secure India Private Limited
Address	Plot No-1303&1304, 4th Floor, Khanamet, HiTech City, Ayappa Society, Madhapur, Hyderabad, Telangana, India
Manufacturer	SHENZHEN HSEM TECHNOLOGY CO., LTD.
Address	4TH FLOOR, 5 PLANTS, TONGFUYU INDUSTRIAL, TAOYUAN STREET, NANSHAN DISTRICT, SHENZHEN P.R. CHINA
Product Designation	GSM/WCDMA Mobile Phone
Brand Name	N/A
Test Model	Freedom
Date of test	Apr.17, 2015 to Apr.23, 2015
Deviation	None
Condition of Test Sample	Normal
Report Template	AGCRT-US-BR/RF

We hereby certify that:
The above equipment was tested by Attestation of Global Compliance (Shenzhen) Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 (2003) and the energy emitted by the sample EUT tested as described in this report is in compliance with radiated emission limits of FCC Rules Part 15.247.

Prepared By	Matt Zhang	
	Matt Zhang	Apr.24, 2015
Checked By	Kidd Yang	
	Kidd Yang	Apr.24, 2015
Authorized By	Solger Zhang	
	Solger Zhang	Apr.24, 2015

2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

The EUT is “GSM/WCDMA Mobile Phone” designed as a “Communication Device”. It is designed by way of utilizing the FHSS technology to achieve the system operation.

A major technical description of EUT is described as following

Operation Frequency	2.402 GHz to 2.480GHz
RF Output Power	8.84dBm(Max)
Bluetooth Version	V 3.0
Modulation	GFSK, π /4-DQPSK, 8DPSK
Number of channels	79
Hardware Version	DX01_MB_P2_V01
Software Version	ALPS.KK1.MP1.V2.11
Antenna Designation	Integrated Antenna
Antenna Gain	0.7dBi
Power Supply	DC3.7V by Battery

2.2. TABLE OF CARRIER FREQUENCYS

Frequency Band	Channel Number	Frequency
2400~2483.5MHZ	0	2402MHZ
	1	2403MHZ
	:	:
	38	2440 MHZ
	39	2441 MHZ
	40	2442 MHZ
	:	:
	77	2479 MHZ
	78	2480 MHZ

2.3. RECEIVER INPUT BANDWIDTH

The input bandwidth of the receiver is 1.3MHZ,In every connection one Bluetooth device is the master and the other one is slave. The master determines the hopping sequence. The slave follows this sequence. Both devices shift between RX and TX time slot according to the clock of the master. Additionally the type of connection(e.g. single of multislot packet) is set up at the beginning of the connection. The master adapts its hopping frequency and its TX/RX timing according to the packet type of the connection. Also the slave of the connection will use these settings.

Repeating of a packet has no influence on the hopping sequence. The hopping sequence generated by the master of the connection will be followed in any case. That means, a repeated packet will not be send on the same frequency, it is send on the next frequency of the hopping sequence.

2.4. EXAMPLE OF A HOPPING SEQUENCY IN DATA MODE

Example of a 79 hopping sequence in data mode:
40,21,44,23,42,53,46,55,48,33,52,35,50,65,54,67
56,37,60,39,58,69,62,71,64,25,68,27,66,57,70,59
72,29,76,31,74,61,78,63,01,41,05,43,03,73,07,75
09,45,13,47,11,77,15,00,64,49,66,53,68,02,70,06
01, 51, 03, 55, 05, 04

2.5. EQUALLY AVERAGE USE OF FREQUENCIES AND BEHAVIOUR

The generation of the hopping sequence in connection mode depends essentially on two input values:
1. LAP/UAP of the master of the connection.
2. Internal master clock

The LAP(lower address part) are the 24 LSB's of the 48 BD_ADDRESS. The BD_ADDRESS is an unambiguous number of every Bluetooth unit. The UAP(upper address part) are the 24MSB's of the 48BD_ADDRESS

The internal clock of a Bluetooth unit is derived from a free running clock which is never adjusted and is never turned off. For ehavior zation with other units only offset are used. It has no relation to the time of the day. Its resolution is at least half the RX/TX slot length of 312.5us.The clock has a cycle of about one day(23h30).In most case it is implemented as 28 bit counter. For the deriving of the hopping sequence the entire. LAP(24 bits),4LSB's(4bits)(Input 1) and the 27MSB's of the clock(Input 2) are used. With this input values different mathematical procedures(permutations, additions, XOR-operations)are performed to generate te Sequence. This will be done at the beginning of every new transmission.

Regarding short transmissions the Bluetooth system has the following ehavior:

The first connection between the two devices is established, a hopping sequence was generated. For Transmitting the wanted data the complete hopping sequence was not used. The connection ended.

The second connection will be established. A new hopping sequence is generated. Due to the fact the Bluetooth clock has a different value, because the period between the two transmission is longer(and it Cannot be shorter) than the minimum resolution of the clock(312.5us).The hopping sequence will always Differ from the first one.

2.6. RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for **FCC ID: 2AEJ9FREEDOM** filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

2.7. TEST METHODOLOGY

Both conducted and radiated testing was performed according to the procedures in FCC DA 00-705. Radiated testing was performed at an antenna to EUT distance 3 meters.

2.8. SPECIAL ACCESSORIES

Refer to section 5.2.

2.9. EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

3. MEASUREMENT UNCERTAINTY

Conducted measurement: +/- 2.75dB
Radiated measurement: +/- 3.2dB

4. DESCRIPTION OF TEST MODES

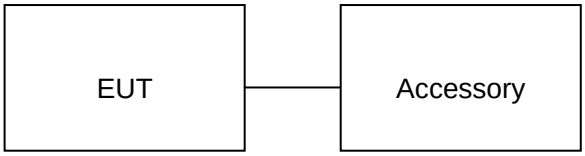
NO.	TEST MODE DESCRIPTION
1	Low channel GFSK
2	Middle channel GFSK
3	High channel GFSK
4	Low channel π /4-DQPSK
5	Middle channel π /4-DQPSK
6	High channel π /4-DQPSK
7	Low channel 8DPSK
8	Middle channel 8DPSK
9	High channel 8DPSK
10	Normal Hopping

Note:
1. All the test modes can be supply by Built-in Li-ion battery, only the result of the worst case was recorded in the report, if no other cases.
2. For Radiated Emission, 3axis were chosen for testing for each applicable mode.

5. SYSTEM TEST CONFIGURATION

5.1. CONFIGURATION OF EUT SYSTEM

Configuration:



5.2. EQUIPMENT USED IN EUT SYSTEM

Item	Equipment	Model No.	ID or Specification	Remark
1	GSM/WCDMA Mobile	Freedom	FCC ID:2AEJ9FREEDOM	EUT
2	Battery	Freedom	3.7V 4000mAH	Accessory
3	USB Cable	Freedom	N/A	Accessory

5.3. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.247	Peak Output Power	Compliant
§15.247	20 dB Bandwidth	Compliant
§15.247	Spurious Emission	Compliant
§15.209	Radiated Emission	Compliant
§15.247	Band Edges	Compliant
§15.207	Conduction Emission	Compliant
§15.247	Number of Hopping Frequency	Compliant
§15.247	Time of Occupancy	Compliant
§15.247	Frequency Separation	Compliant

6. TEST FACILITY

Site	Compliance Certification Services (Shenzhen) Inc.
Location	No.10-1 Mingkeda Logistics park, No.18, Huanguan South Rd.,Guan Lan Town, Baoan District, Shenzhen, China
Description	Test Firm Registration Number: 441872

TEST EQUIPMENT LIST

Description	Manufacturer	Model	S/N	Cal. Date	Cal. Due
Power Probe	R&S	NRP-Z23	100323	07/25/2014	07/24/2015
RF attenuator	N/A	RFA20db	68	N/A	N/A
Spectrum Analyzer	Agilent	E4440A	US41421290	02/17/2015	02/16/2016
Amplifier	EM	EM30180	0607030	02/17/2015	02/16/2016
Horn Antenna	EM	EM-AH-10180	67	02/17/2015	02/16/2016
Horn Antenna	A.H. Systems Inc.	SAS-574	--	07/25/2014	07/24/2015
EMI Test Receiver	Rohde & Schwarz	ESCI	100694	07/25/2014	07/24/2015
WIDEBAND REQUENCY ANTENNA	SCHWARZBECK	VULB9168	26	08/16/2014	08/15/2015
LISN	R&S	ESH3-Z5	8389791009	07/25/2014	07/24/2015
Loop Antenna	A.H.	SAS-562B	SEL0097	05/10/2014	05/09/2015
Isolation Transformer	LETEAC	LTBK	--	07/25/2014	07/24/2015
Radiation Cable 1	Sat	RE1	R003	06/04/2014	06/03/2015
Radiation Cable 2	Sat	RE2	R002	06/04/2014	06/03/2015
Conduction Cable	Sat	CE1	C001	06/04/2014	06/03/2015

Radiated Emission Test Site 966(2)					
Name of Equipment	**Manufacturer**	**Model Number**	**Serial Number**	**Last Calibration**	**Due Calibration**
PSA Series Spectrum Analyzer	Agilent	E4446A	US44300399	03/01/2015	03/01/2016
EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCI	100783	03/09/2015	03/08/2016
Amplifier	MITEQ	AM-1604-3000	1123808	03/18/2015	03/17/2016
High Noise Amplifier	Agilent	8449B	3008A01838	03/18/2015	03/17/2016
Board-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170-497	07/10/2014	07/09/2015
Bilog Antenna	SCHAFFNER	CBL6143	5082	03/01/2015	03/01/2016
Horn Antenna	SCHWARZBECK	BBHA9120	D286	03/01/2015	03/01/2016
Loop Antenna	COM-POWER	AL-130	121044	09/27/2014	09/26/2015
Turn Table	N/A	N/A	N/A	N.C.R	N.C.R
Controller	Sunol Sciences	SC104V	022310-1	N.C.R	N.C.R
Controller	CT	N/A	N/A	N.C.R	N.C.R
Temp. / Humidity Meter	Anymetre	JR913	N/A	02/28/2015	02/27/2016
Antenna Tower	SUNOL	TLT2	N/A	N.C.R	N.C.R
Test S/W	FARAD	LZ-RF / CCS-SZ-3A2			

Conducted Emission Test Site					
Name of Equipment	**Manufacturer**	**Model Number**	**Serial Number**	**Last Calibration**	**Due Calibration**
EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCI	100783	03/09/2015	03/08/2016
LISN(EUT)	ROHDE&SCHWARZ	ENV216	101543-WX	03/09/2015	03/08/2016
LISN	EMCO	3825/2	8901-1459	03/09/2015	03/08/2016
Temp. / Humidity Meter	VICTOR	HTC-1	N/A	03/04/2015	03/03/2016
Test S/W	FARAD	EZ-EMC/ CCS-3A1-CE			

7. PEAK OUTPUT POWER

7.1. MEASUREMENT PROCEDURE

For peak power test:

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on the top, middle and the bottom operation frequency individually.
3. RBW > the 20 dB bandwidth of the emission being measured, VBW ≥ RBW.
4. Record the maximum power from the Spectrum Analyzer.

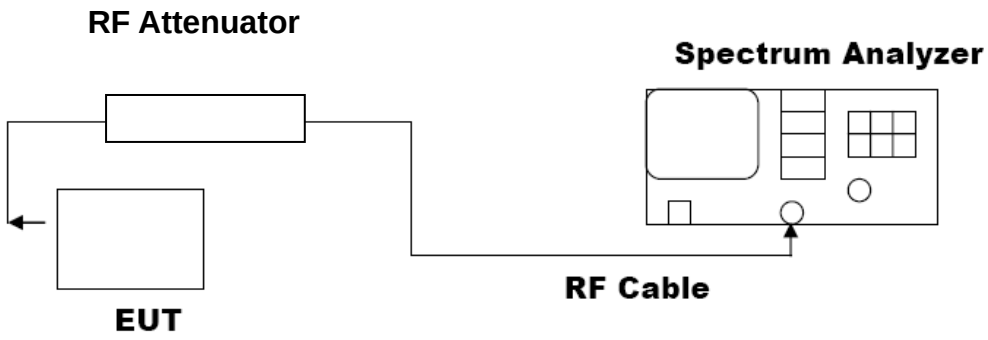
For average power test:

1. Connect EUT RF output port to power probe through an RF attenuator.
2. Connect the power probe to the PC.
3. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
4. Record the maximum power from the software.
5. The maximum peak power shall be less 125mW (21dBm).

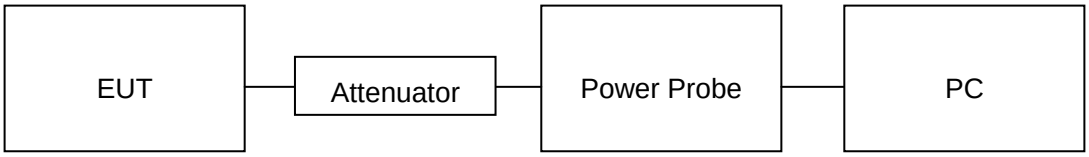
Note：The EUT was tested according to DA000705 for compliance to FCC 47CFR 15.247 requirements.

7.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

PEAK POWER TEST SETUP



AVERAGE POWER SETUP



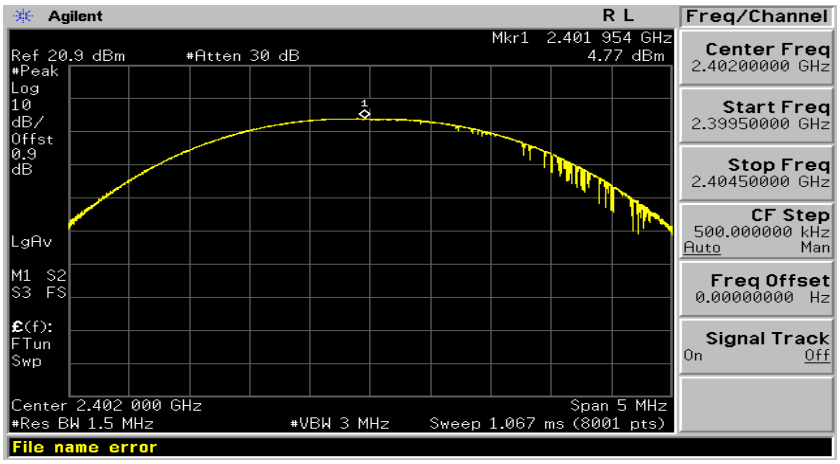
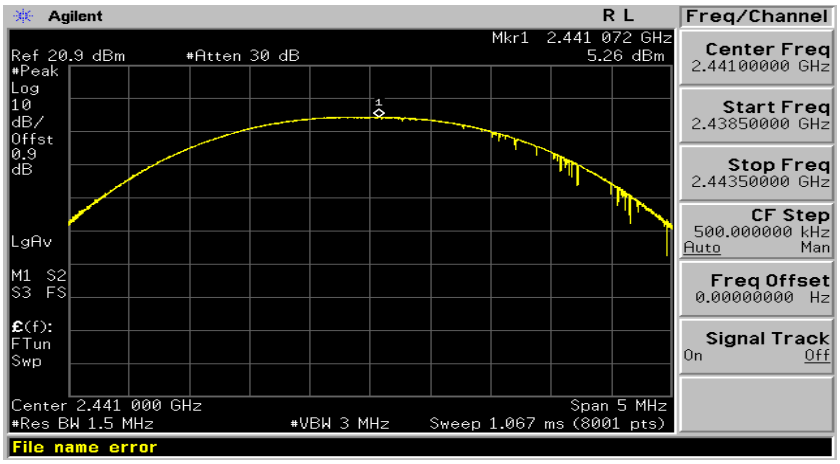
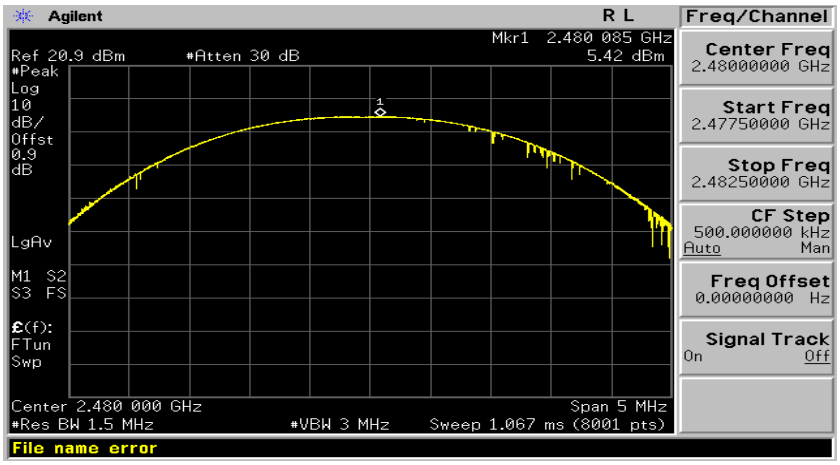
7.3. LIMITS AND MEASUREMENT RESULT

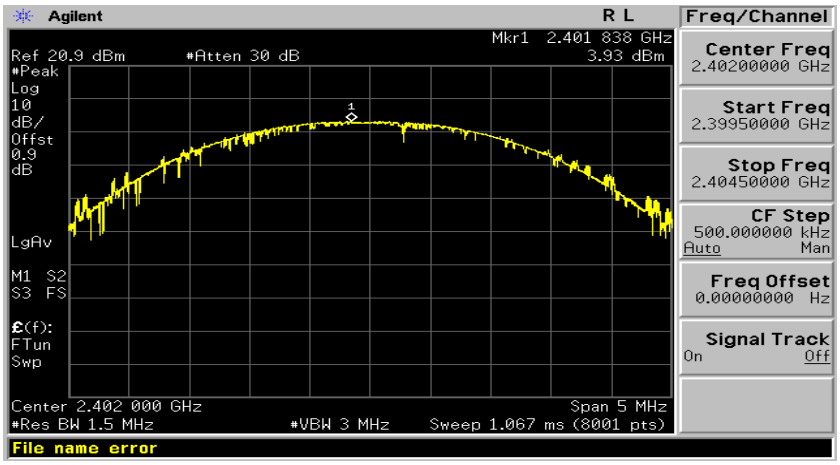
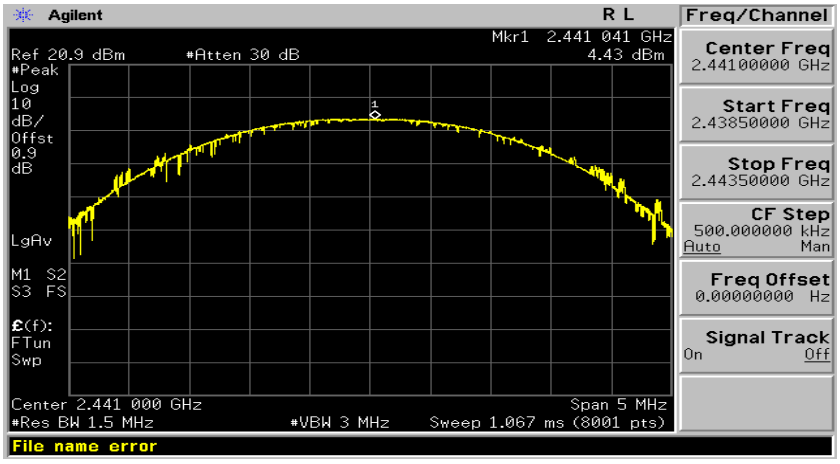
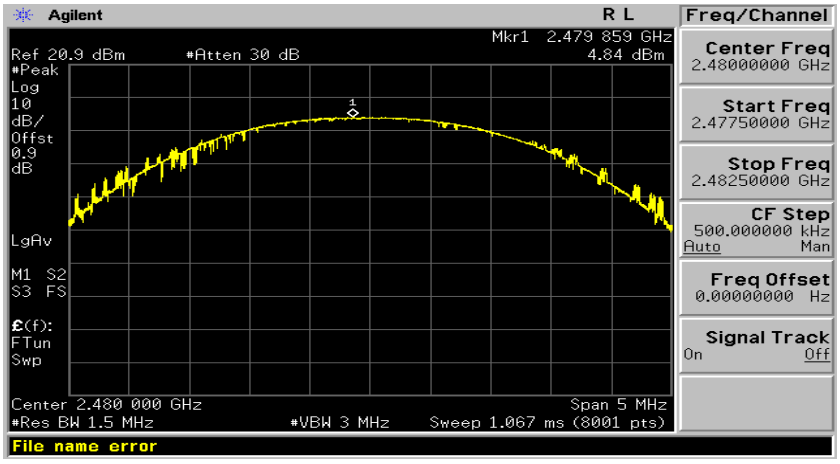
PEAK OUTPUT POWER MEASUREMENT RESULT FOR GFSK MOUDULATION				
Frequency (GHz)	**Average Power (dBm)**	**Peak Power (dBm)**	**Applicable Limits (dBm)**	**Pass or Fail**
2.402	2.76	4.77	21	Pass
2.441	3.25	5.26	21	Pass
2.480	3.41	5.42	21	Pass

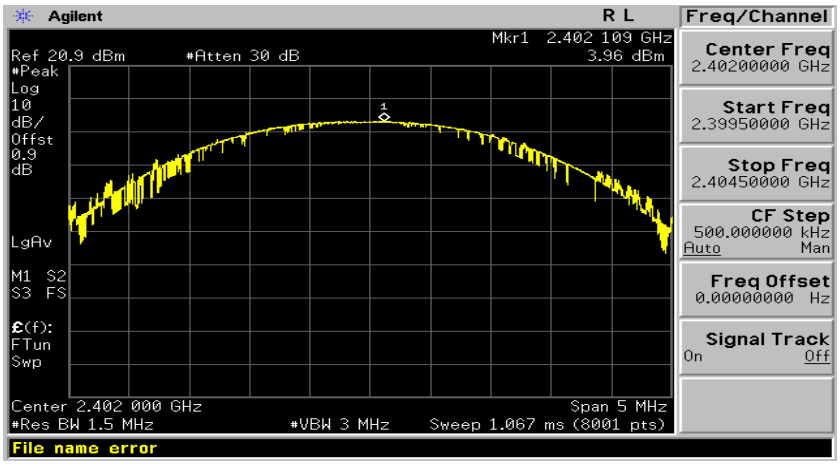
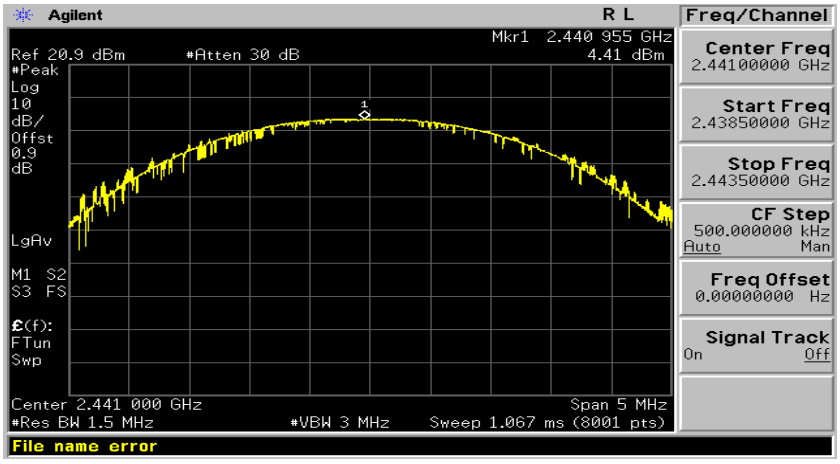
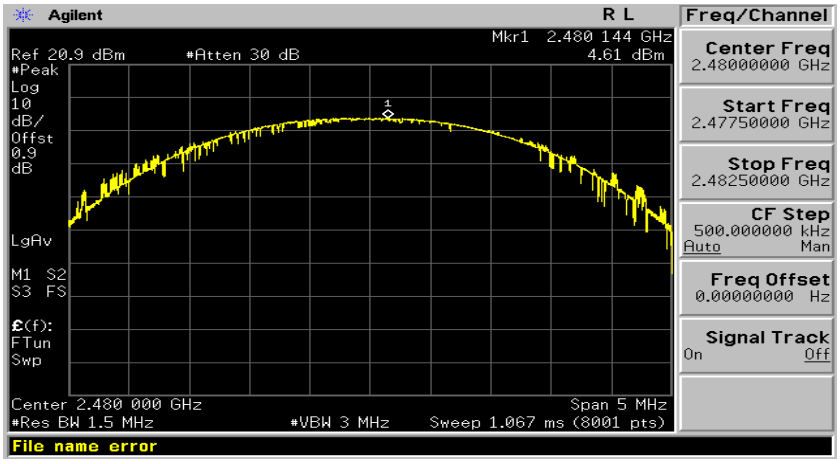
PEAK OUTPUT POWER MEASUREMENT RESULT FOR Ⅱ /4-DQPSK MODULATION				
Frequency (GHz)	**Average Power (dBm)**	**Peak Power (dBm)**	**Applicable Limits (dBm)**	**Pass or Fail**
2.402	1.92	3.93	21	Pass
2.441	2.42	4.43	21	Pass
2.480	2.83	4.84	21	Pass

PEAK OUTPUT POWER MEASUREMENT RESULT FOR 8-DPSK MODULATION				
Frequency (GHz)	**Average Power (dBm)**	**Peak Power (dBm)**	**Applicable Limits (dBm)**	**Pass or Fail**
2.402	1.95	3.96	21	Pass
2.441	2.4	4.41	21	Pass
2.480	2.6	4.61	21	Pass

Test Graph

Graphs	
GFSK/LCH	
GFSK/MCH	
GFSK/HCH	

π /4DQPSK/LCH	
π /4DQPSK/MCH	
π /4DQPSK/HCH	

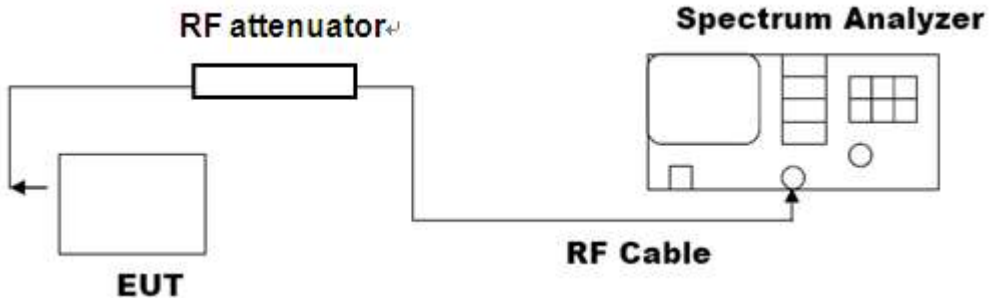
8DPSK/LCH	
8DPSK/MCH	
8DPSK/HCH	

8. 20DB BANDWIDTH

8.1. MEASUREMENT PROCEDURE

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2, Set the EUT Work on the top, the middle and the bottom operation frequency individually.
3. Set Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hoping channel
   RBW ≥ 1% of the 20 dB bandwidth, VBW ≥ RBW; Sweep = auto; Detector function = peak
4. Set SPA Trace 1 Max hold, then View.

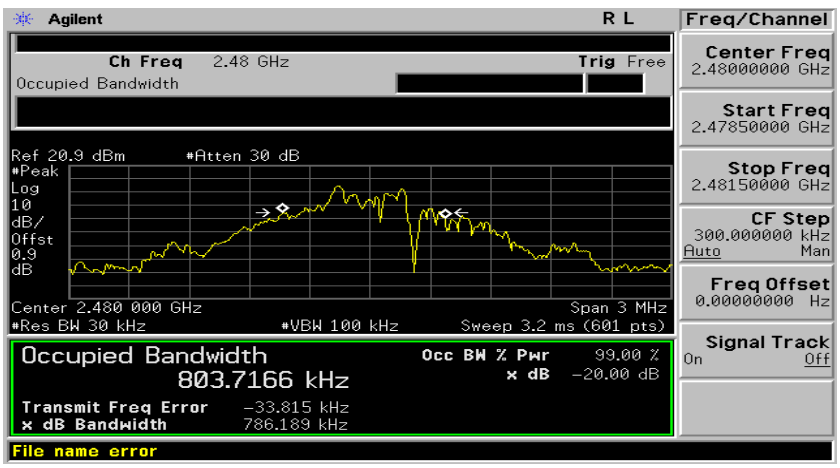
8.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

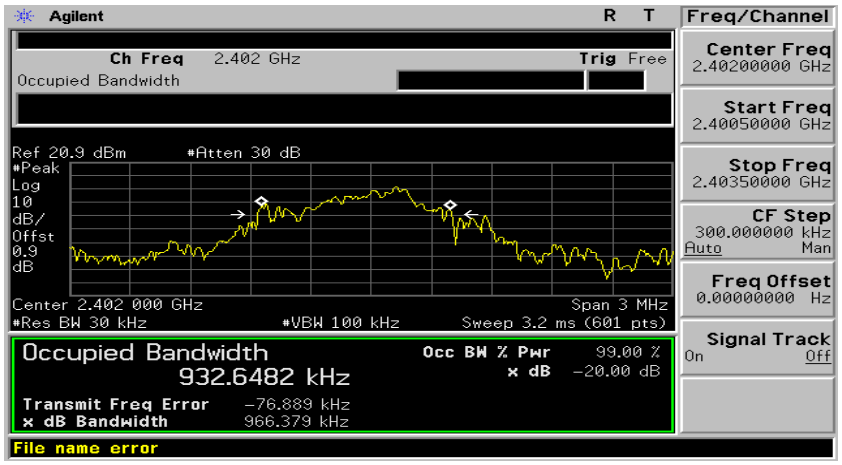
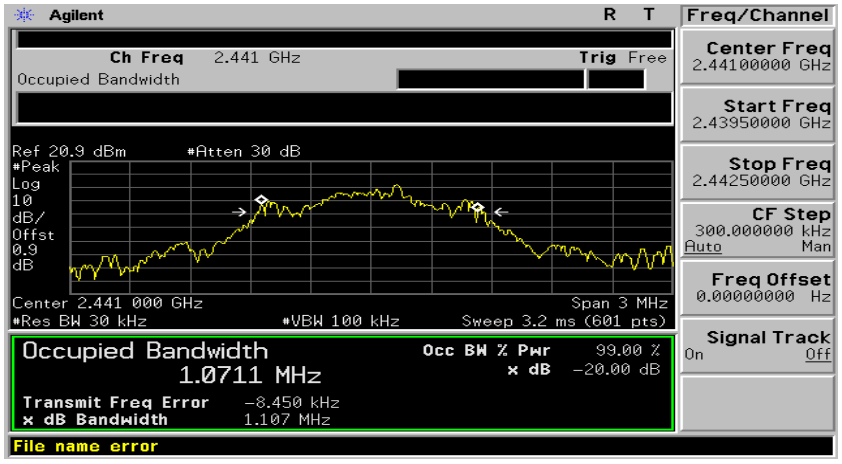
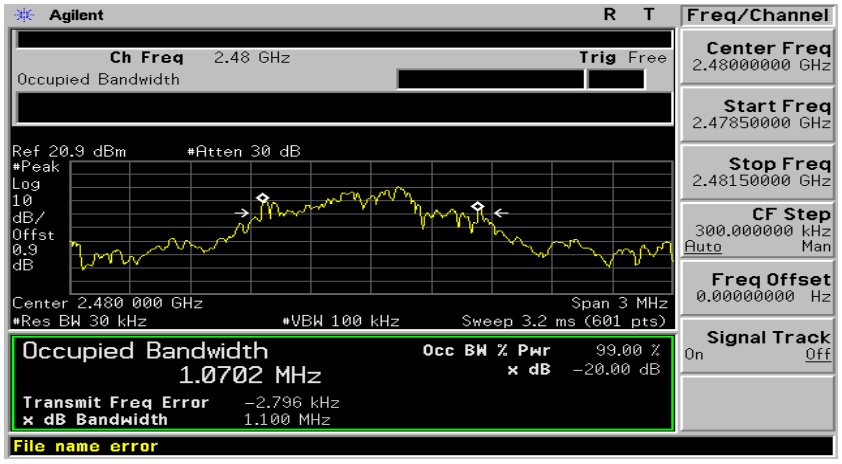


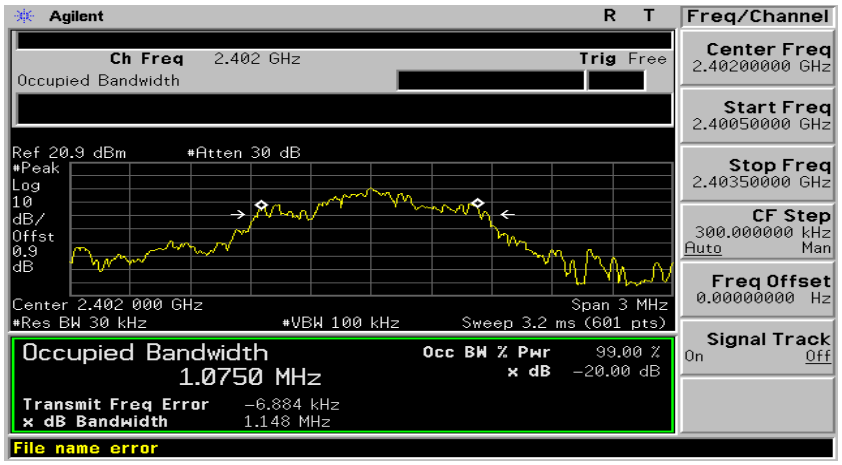
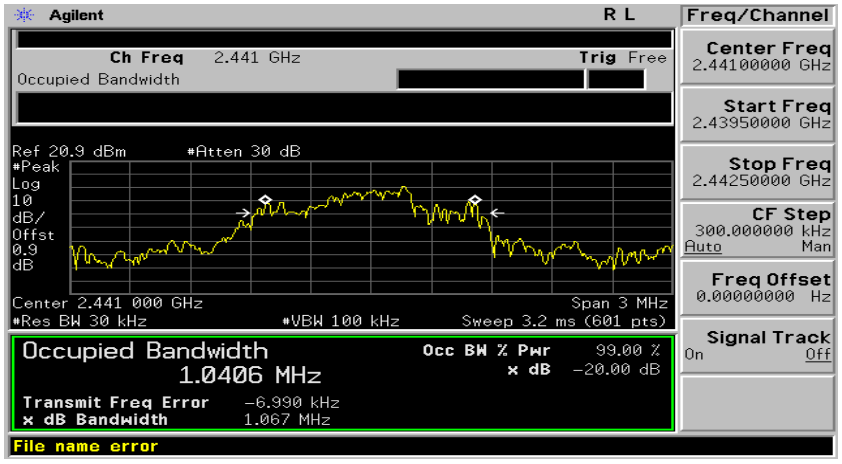
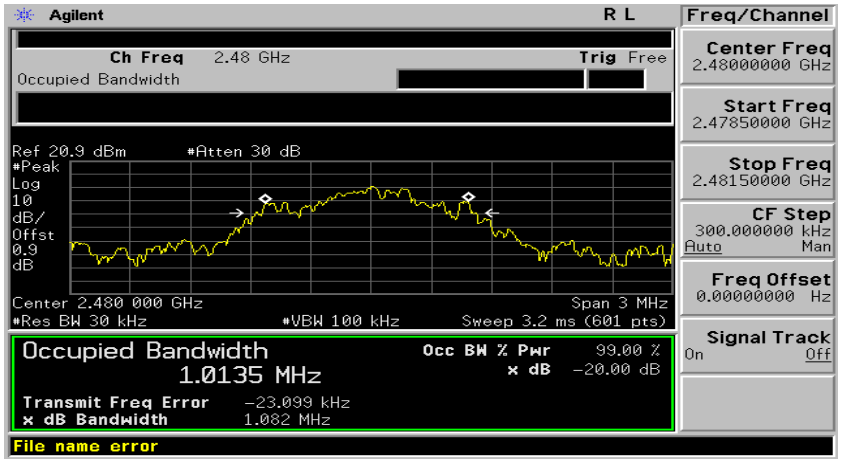
8.3. LIMITS AND MEASUREMENT RESULTS

Mode	Channel.	EBW [MHz]	OBW [MHz]	Verdict
GFSK	LCH	0.6876	0.8796	PASS
GFSK	MCH	0.8297	0.7524	PASS
GFSK	HCH	0.7862	0.8037	PASS
π/4DQPSK	LCH	0.9664	0.9326	PASS
π/4DQPSK	MCH	1.1071	1.0711	PASS
π/4DQPSK	HCH	1.1002	1.0702	PASS
8DPSK	LCH	1.1484	1.0750	PASS
8DPSK	MCH	1.0668	1.0406	PASS
8DPSK	HCH	1.0824	1.0135	PASS

Test Graph

Graphs	
GFSK/LCH	
GFSK/MCH	
GFSK/HCH	

π /4DQPSK/LCH	
π /4DQPSK/MCH	
π /4DQPSK/HCH	

8DPSK/LCH	
8DPSK/MCH	
8DPSK/HCH	

9. CONDUCTED SPURIOUS EMISSION

9.1. MEASUREMENT PROCEDURE

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on the top, the Middle and the bottom operation frequency individually.
3. Set the Span = wide enough to capture the peak level of the in-band emission and all spurious emissions from the lowest frequency generated in the EUT up through the 10th harmonic.
   RBW = 100 kHz; VBW ≥ RBW; Sweep = auto; Detector function = peak.
4. Set SPA Trace 1 Max hold, then View.

Note: The EUT was tested according to DA000705 for compliance to FCC 47CFR 15.247 requirements. Owing to satisfy the requirements of the number of measurement points, we set the RBW=1MHz, VBW＞RBW, scan up through 10th harmonic, and consider the tested results as the worst case, if the tested results conform to the requirement, we can deem that the real tested results(set the RBW=100KHz, VBW＞RBW) are conform to the requirement.

9.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

The same as described in section 8.2

9.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6

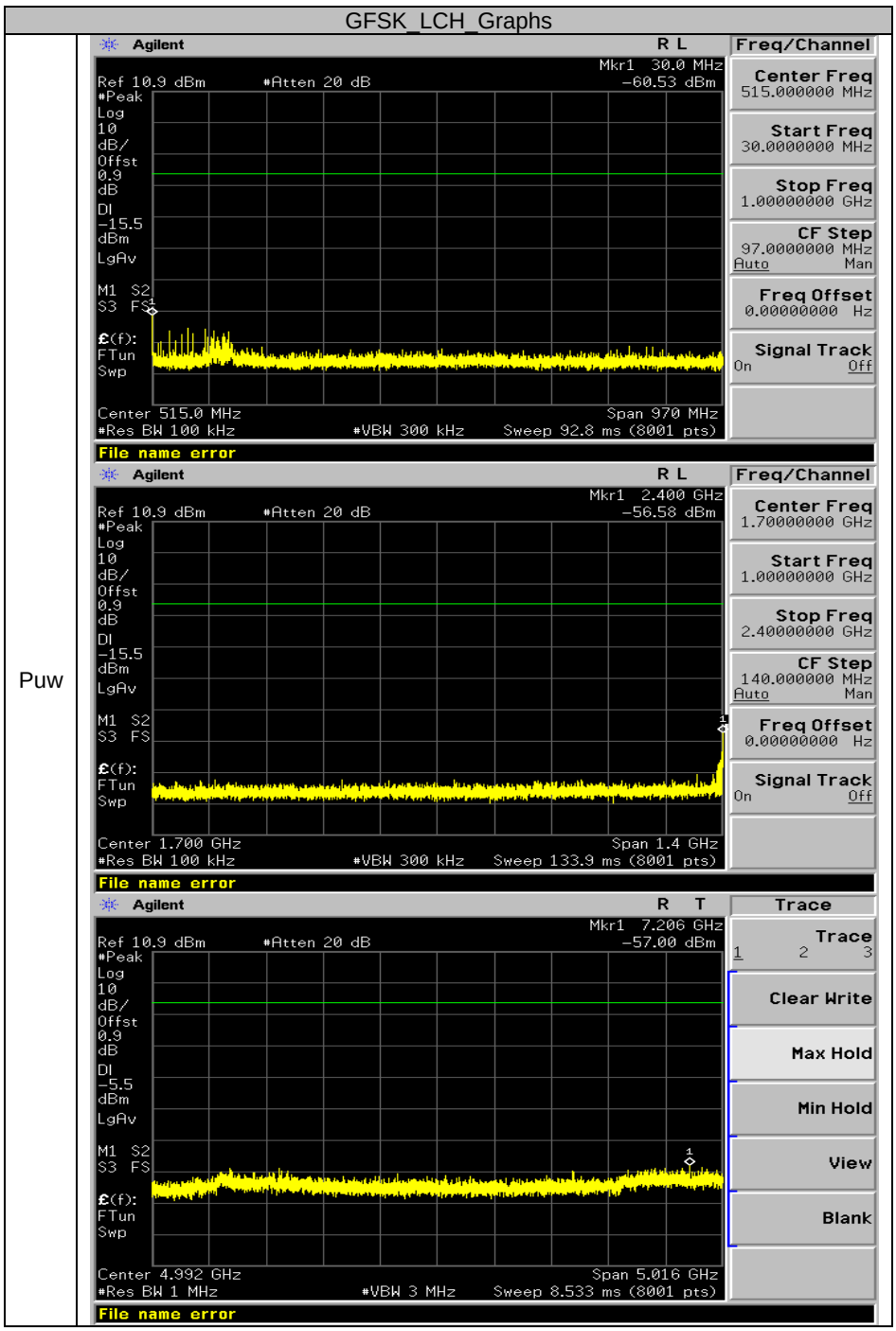
9.4. LIMITS AND MEASUREMENT RESULT

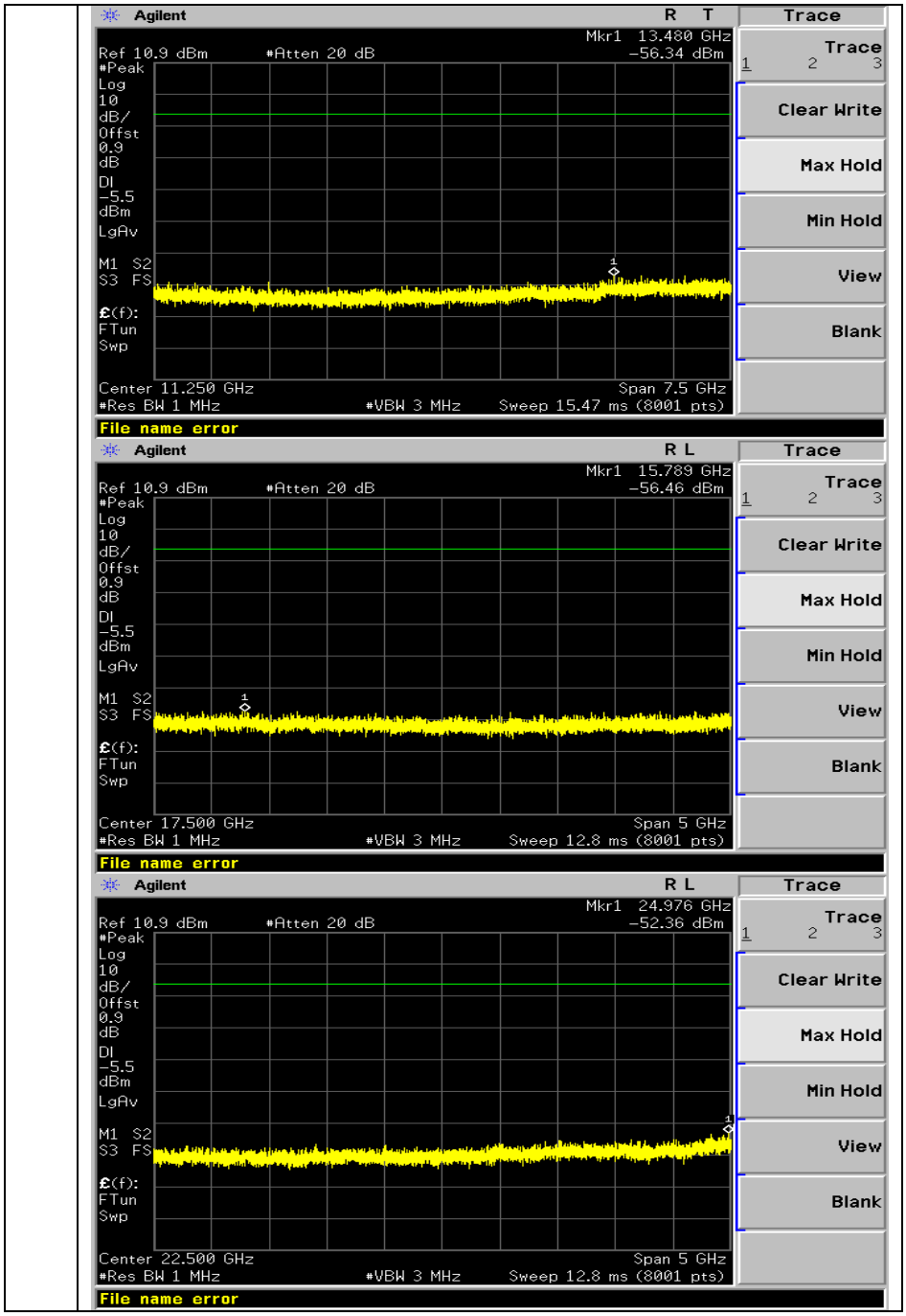
LIMITS AND MEASUREMENT RESULT		
Applicable Limits	**Measurement Result**	
	Test Data	**Criteria**
In any 100 KHz Bandwidth Outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produce by the intentional radiator shall be at least 20 dB below that in 100KHz bandwidth within the band that contains the highest level of the desired power. In addition, radiation emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in§15.209(a))	At least -20dBc than the limit Specified on the BOTTOM Channel	PASS
	At least -20dBc than the limit Specified on the TOP Channel	PASS

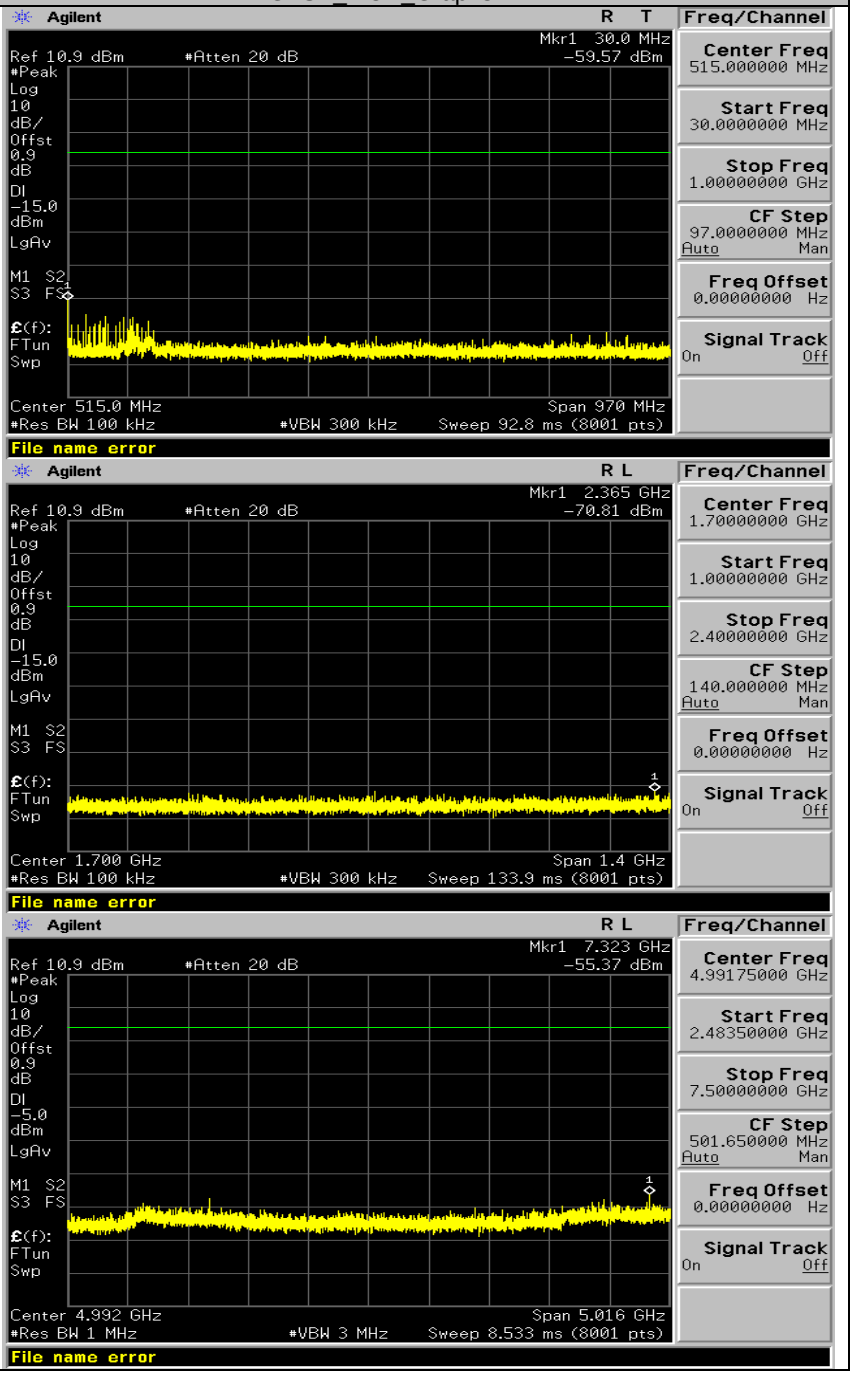
Test Graph

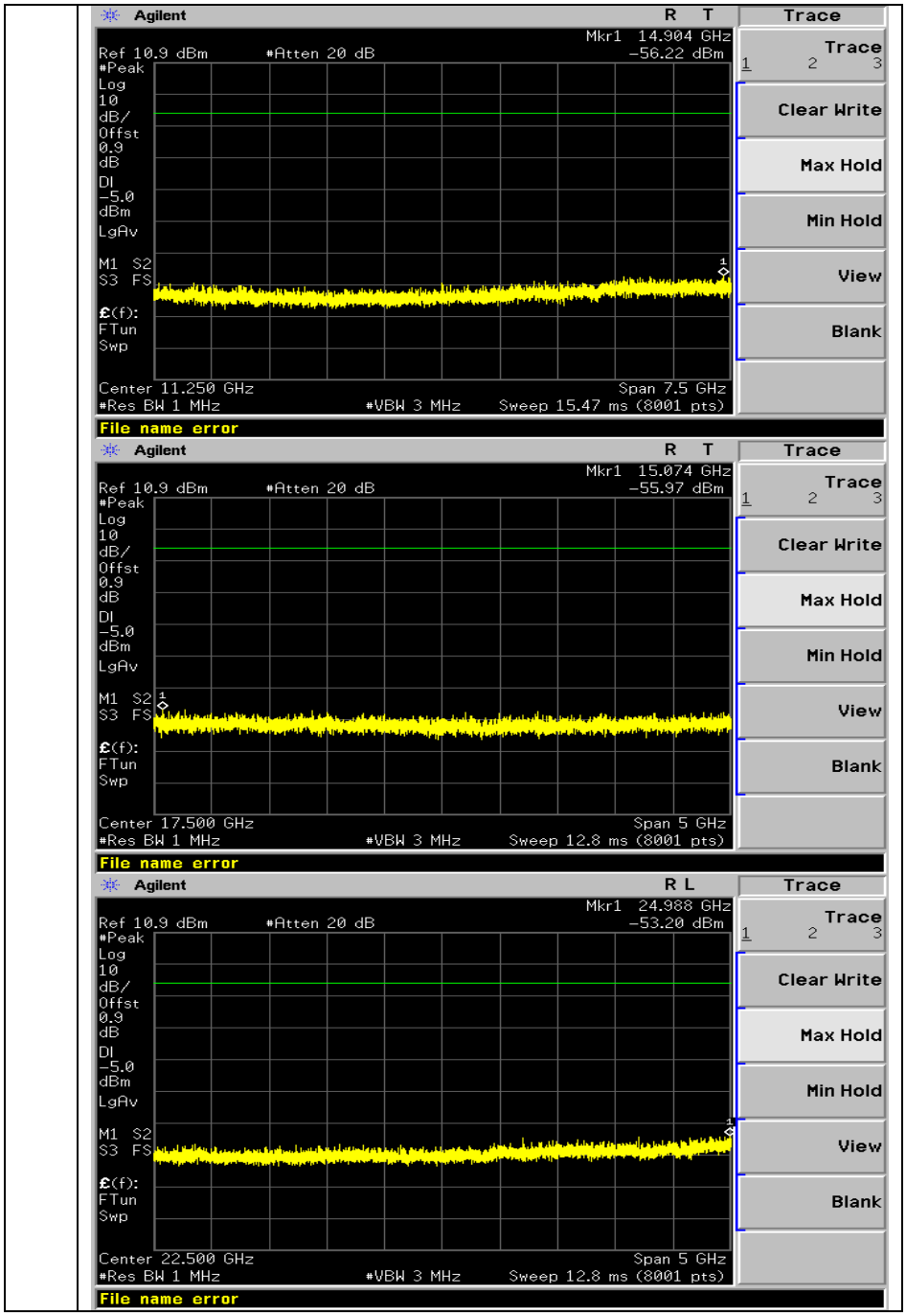
GFSK_LCH_Graphs

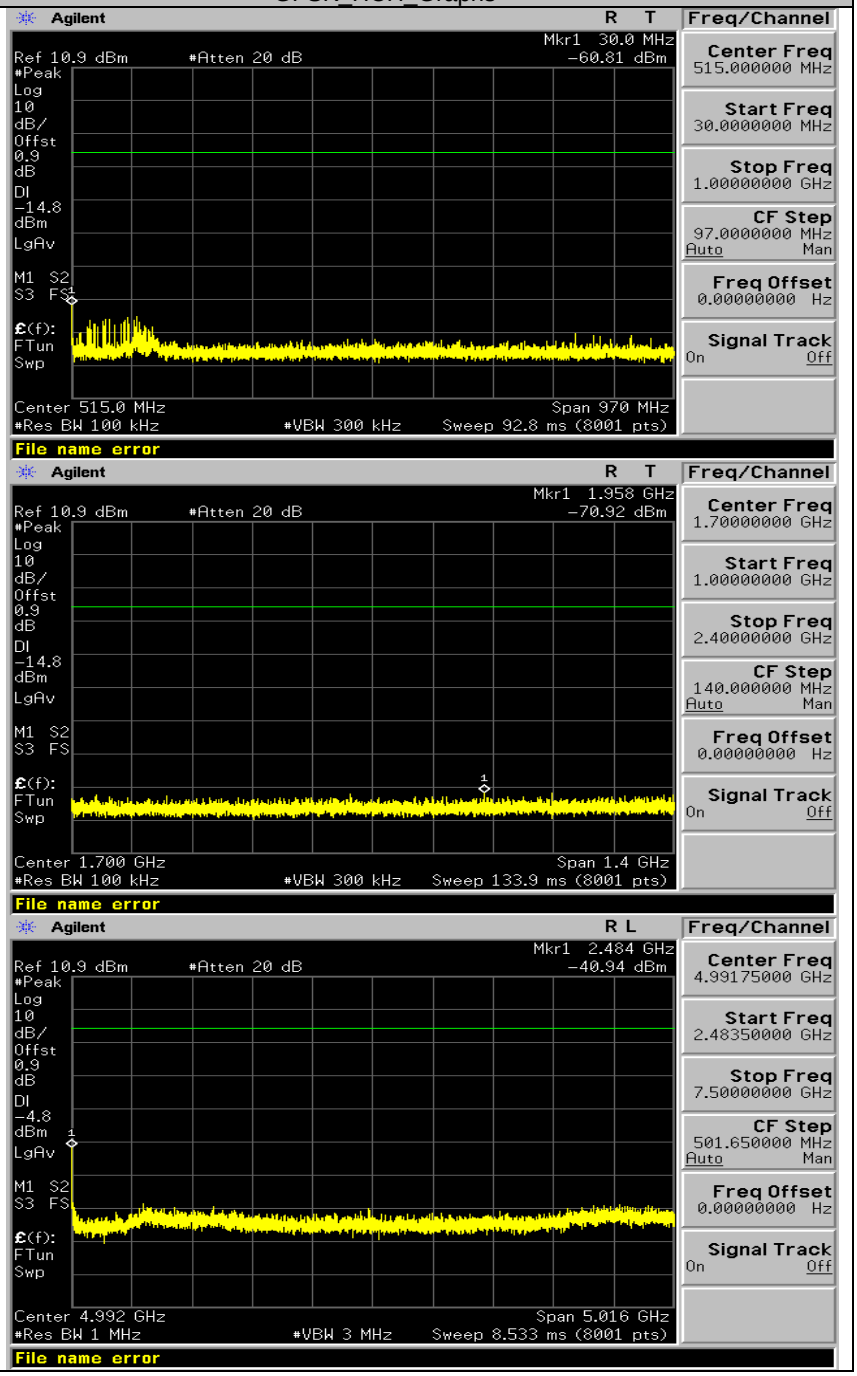
Puw

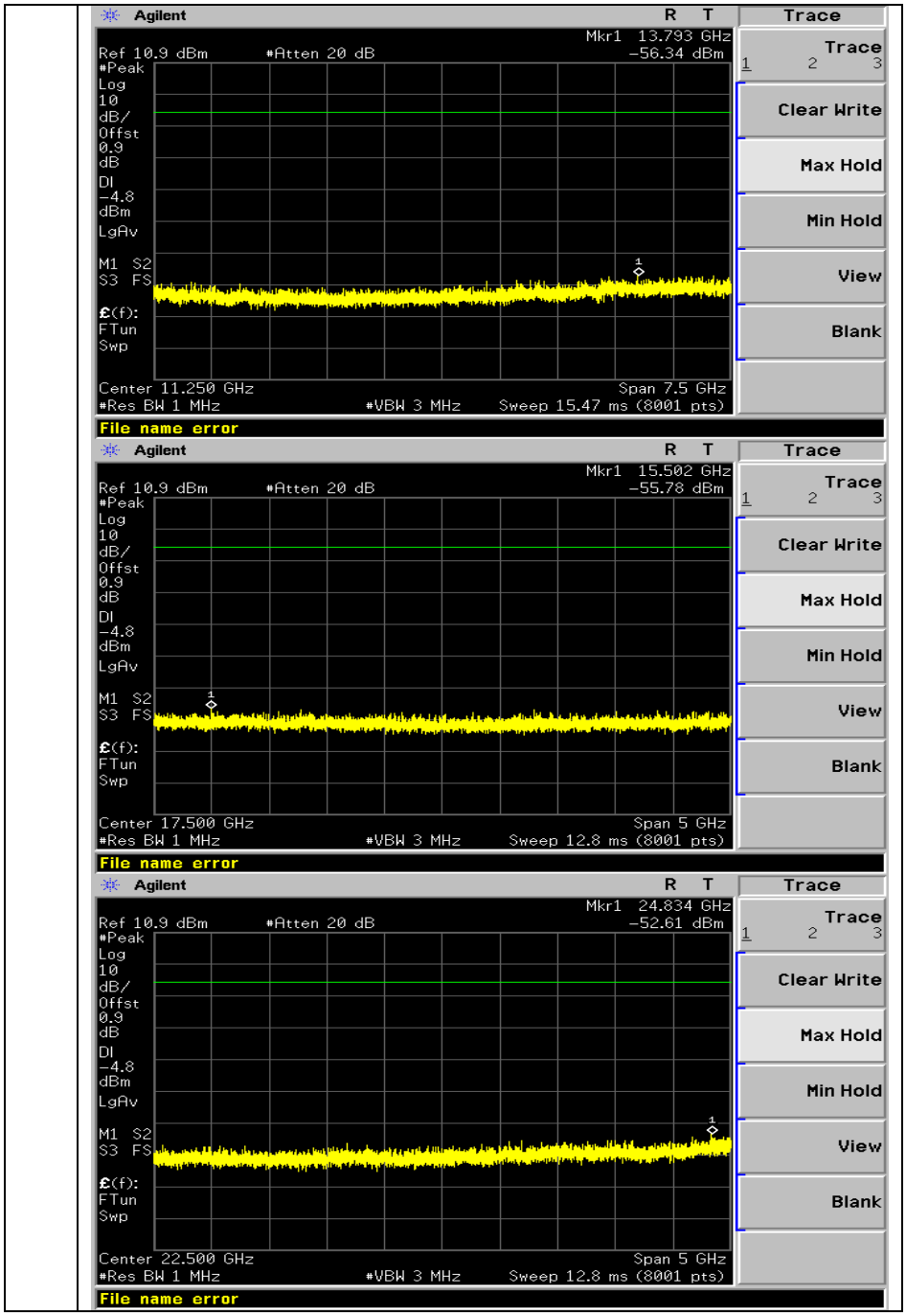


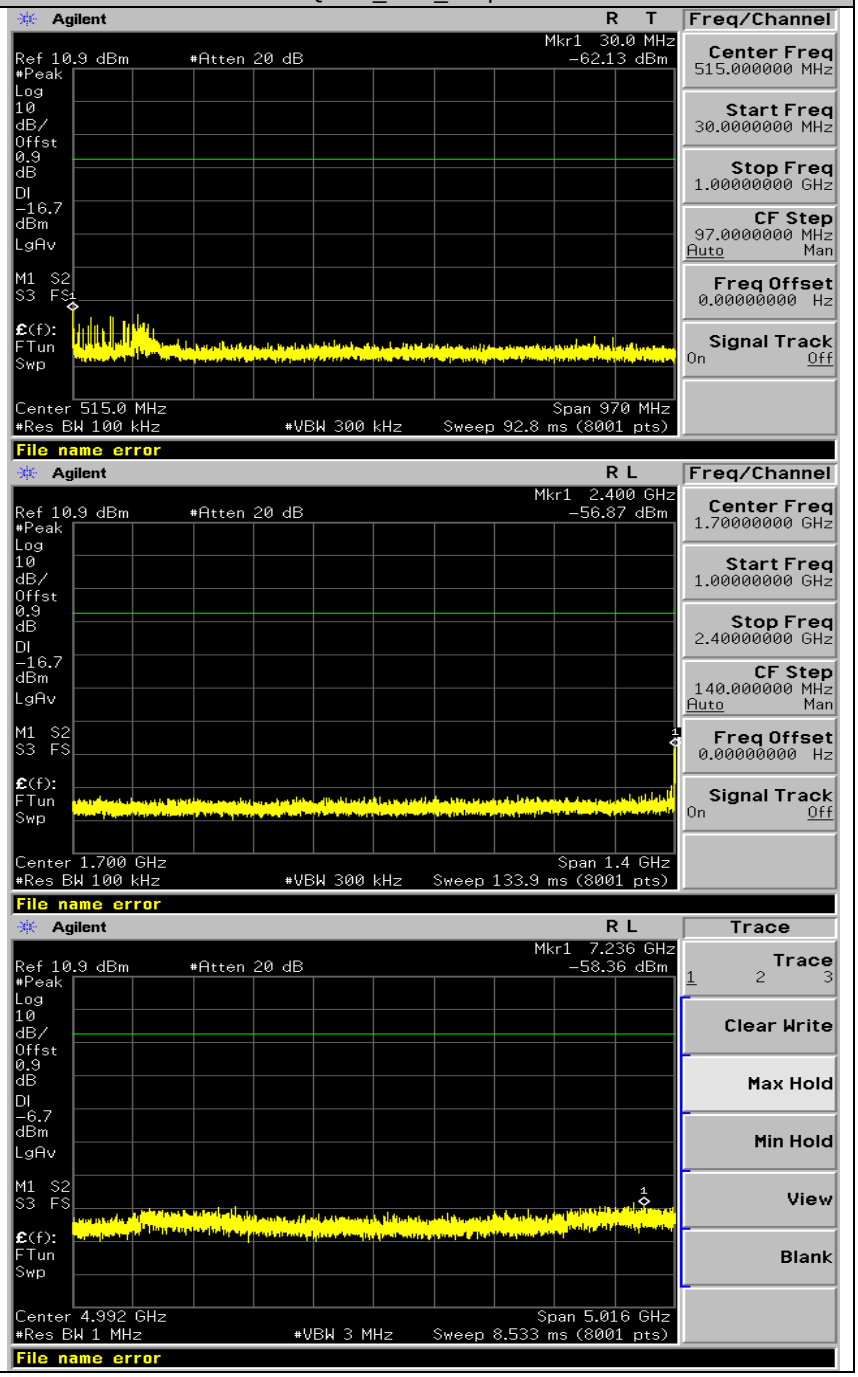

Agilent
R T
Trace
Mkr1 13.480 GHz
Ref 10.9 dBm
#Atten 20 dB
-56.34 dBm
#Peak
Log
10
dB/
Offst
0.9
dB
Dl
-5.5
dBm
LgAv
M1 S2
S3 FS
£(f):
FTun
Swp
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
Center 11.250 GHz
Span 7.5 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 15.47 ms (8001 pts)
File name error
Agilent
R L
Trace
Mkr1 15.789 GHz
Ref 10.9 dBm
#Atten 20 dB
-56.46 dBm
#Peak
Log
10
dB/
Offst
0.9
dB
Dl
-5.5
dBm
LgAv
M1 S2
S3 FS
£(f):
FTun
Swp
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
Center 17.500 GHz
Span 5 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 12.8 ms (8001 pts)
File name error
Agilent
R L
Trace
Mkr1 24.976 GHz
Ref 10.9 dBm
#Atten 20 dB
-52.36 dBm
#Peak
Log
10
dB/
Offst
0.9
dB
Dl
-5.5
dBm
LgAv
M1 S2
S3 FS
£(f):
FTun
Swp
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
Center 22.500 GHz
Span 5 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 12.8 ms (8001 pts)
File name error

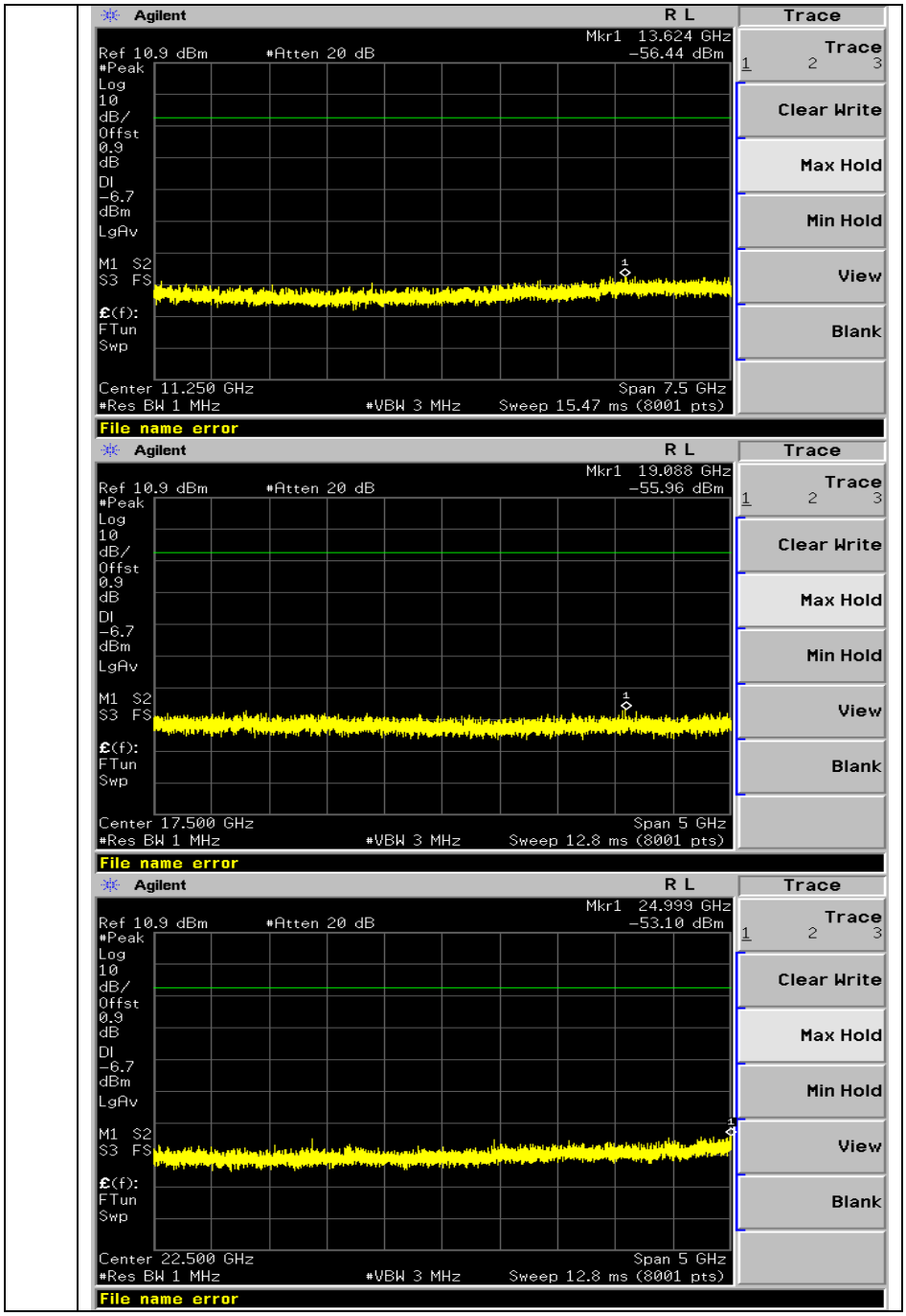
GFSK_MCH_Graphs	
Puw	

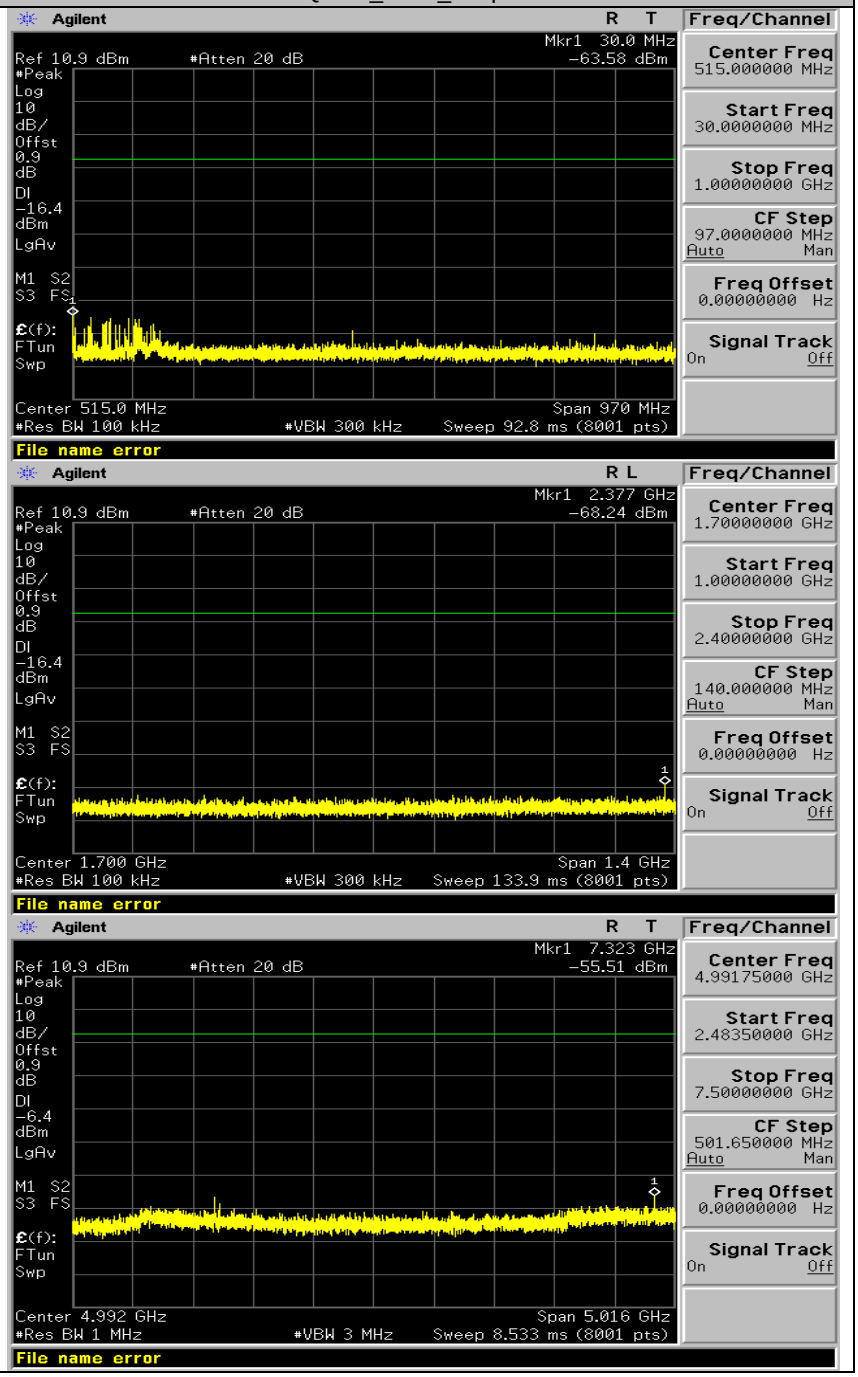

Agilent
R T
Trace
Mkr1 14.904 GHz
Ref 10.9 dBm
#Atten 20 dB
-56.22 dBm
#Peak
Log
10
dB/
Offst
0.9
dB
Dl
-5.0
dBm
LgAv
M1 S2
S3 FS
£(f):
FTun
Swp
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
Center 11.250 GHz
Span 7.5 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 15.47 ms (8001 pts)
File name error
Agilent
R T
Trace
Mkr1 15.074 GHz
Ref 10.9 dBm
#Atten 20 dB
-55.97 dBm
#Peak
Log
10
dB/
Offst
0.9
dB
Dl
-5.0
dBm
LgAv
M1 S2
S3 FS
£(f):
FTun
Swp
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
Center 17.500 GHz
Span 5 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 12.8 ms (8001 pts)
File name error
Agilent
R L
Trace
Mkr1 24.988 GHz
Ref 10.9 dBm
#Atten 20 dB
-53.20 dBm
#Peak
Log
10
dB/
Offst
0.9
dB
Dl
-5.0
dBm
LgAv
M1 S2
S3 FS
£(f):
FTun
Swp
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
Center 22.500 GHz
Span 5 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 12.8 ms (8001 pts)
File name error

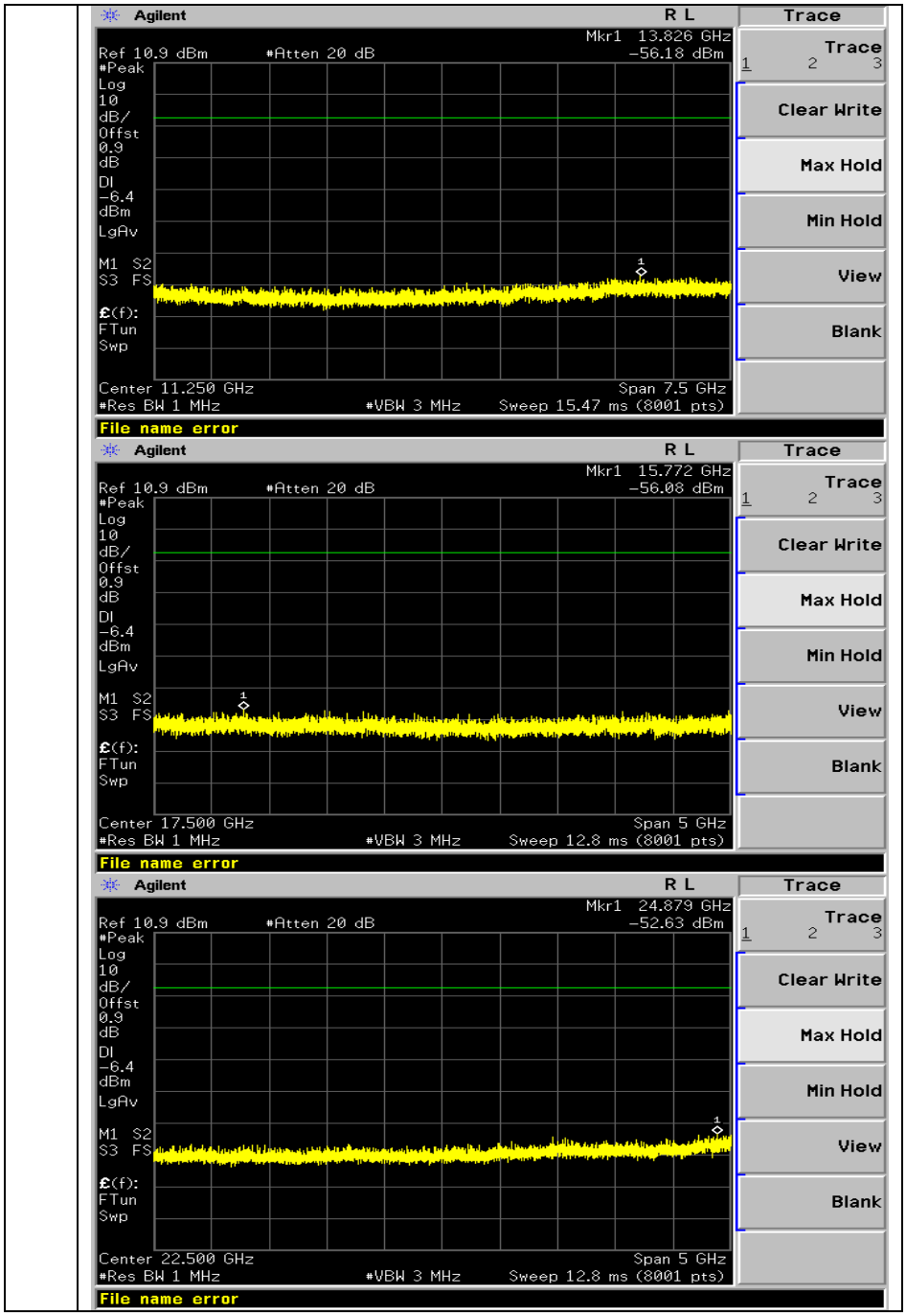
GFSK_HCH_Graphs	
Puw	

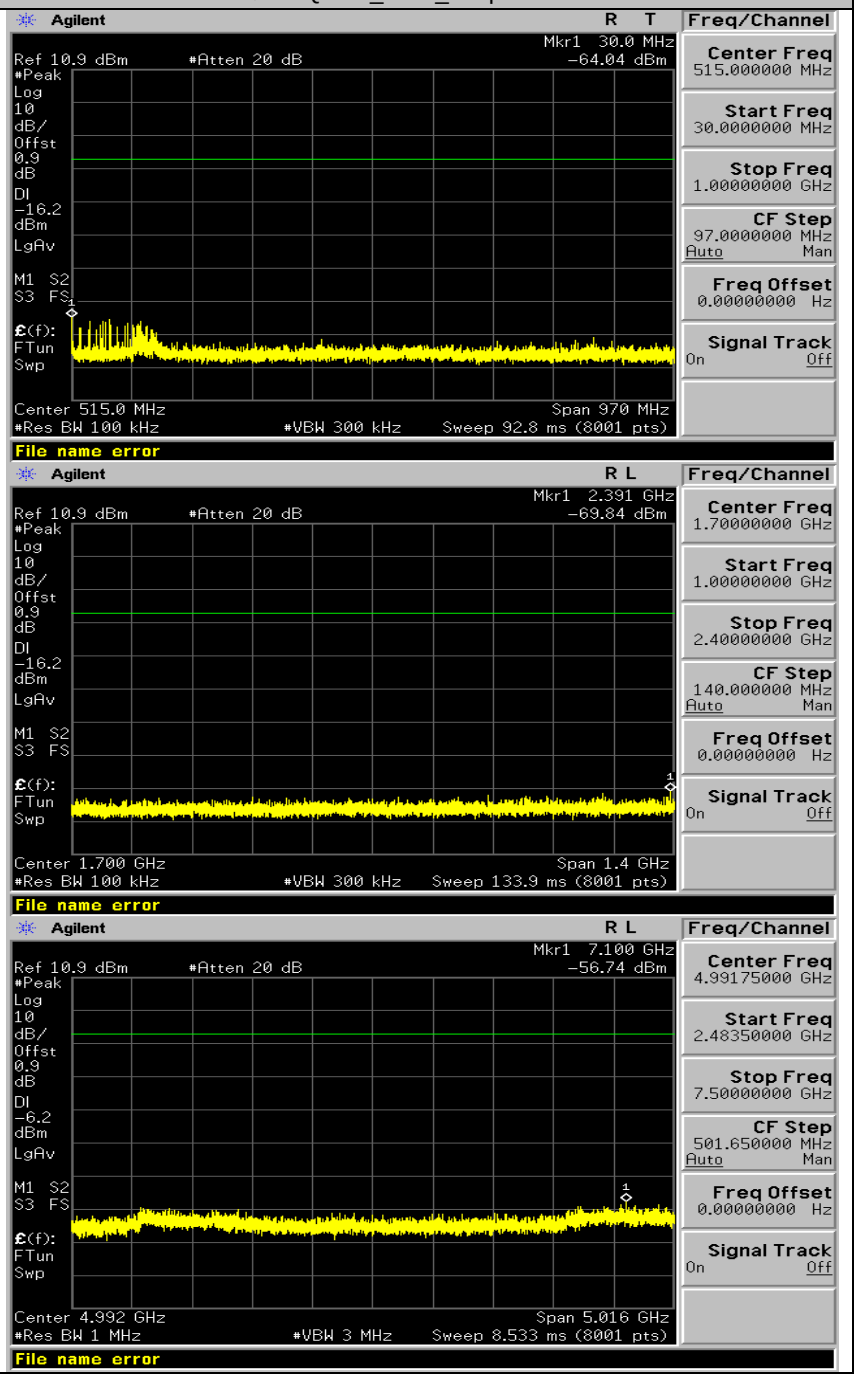

Agilent
R T
Trace
Mkr1 13.793 GHz
Ref 10.9 dBm
#Atten 20 dB
-56.34 dBm
#Peak
Log
10
dB/
Offst
0.9
dB
Dl
-4.8
dBm
LgAv
M1 S2
S3 FS
£(f):
FTun
Swp
Center 11.250 GHz
Span 7.5 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 15.47 ms (8001 pts)
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
File name error
Agilent
R T
Trace
Mkr1 15.502 GHz
Ref 10.9 dBm
#Atten 20 dB
-55.78 dBm
#Peak
Log
10
dB/
Offst
0.9
dB
Dl
-4.8
dBm
LgAv
M1 S2
S3 FS
£(f):
FTun
Swp
Center 17.500 GHz
Span 5 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 12.8 ms (8001 pts)
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
File name error
Agilent
R T
Trace
Mkr1 24.834 GHz
Ref 10.9 dBm
#Atten 20 dB
-52.61 dBm
#Peak
Log
10
dB/
Offst
0.9
dB
Dl
-4.8
dBm
LgAv
M1 S2
S3 FS
£(f):
FTun
Swp
Center 22.500 GHz
Span 5 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 12.8 ms (8001 pts)
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
File name error

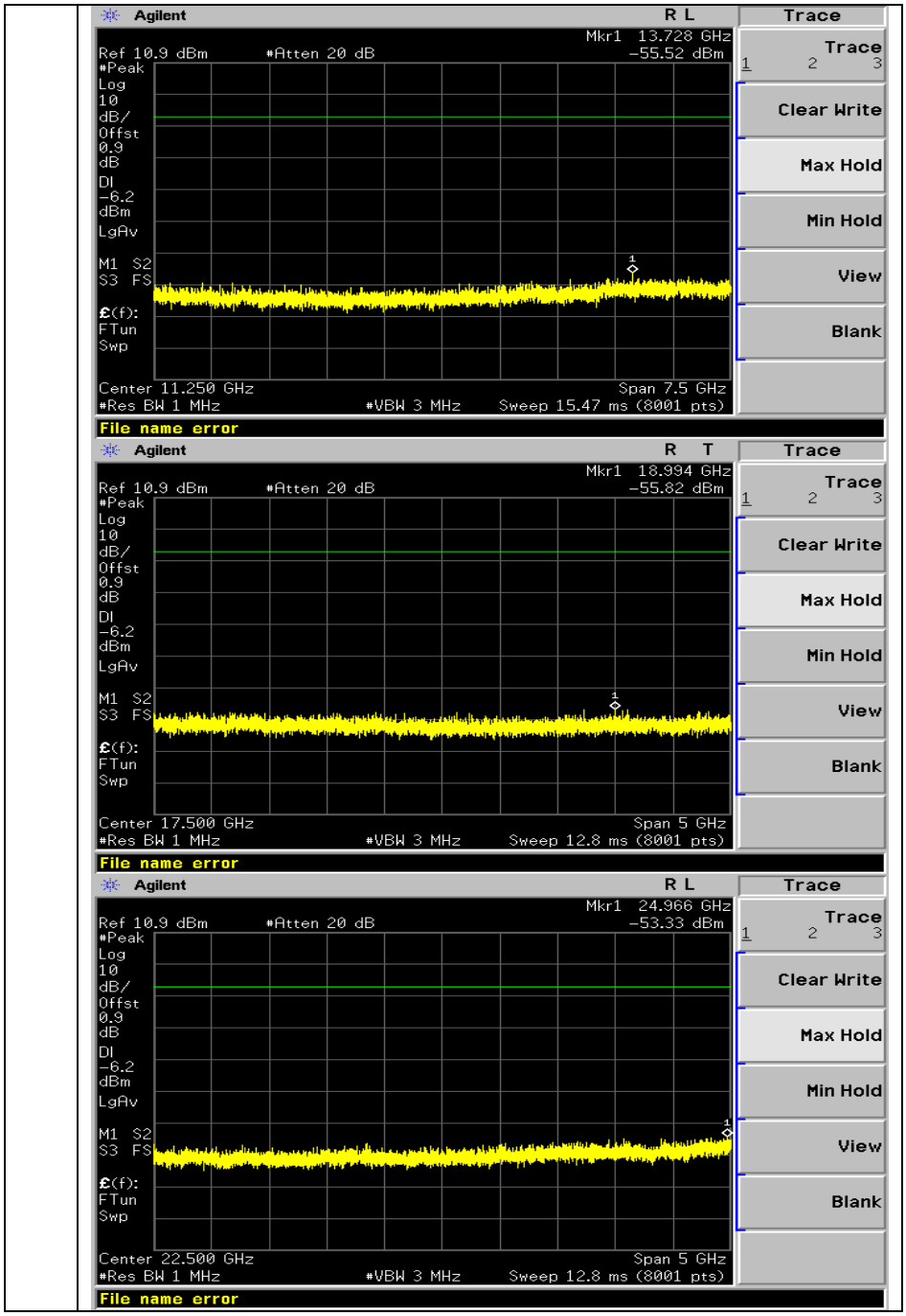
π/4DQPSK_LCH_Graphs	
Puw	

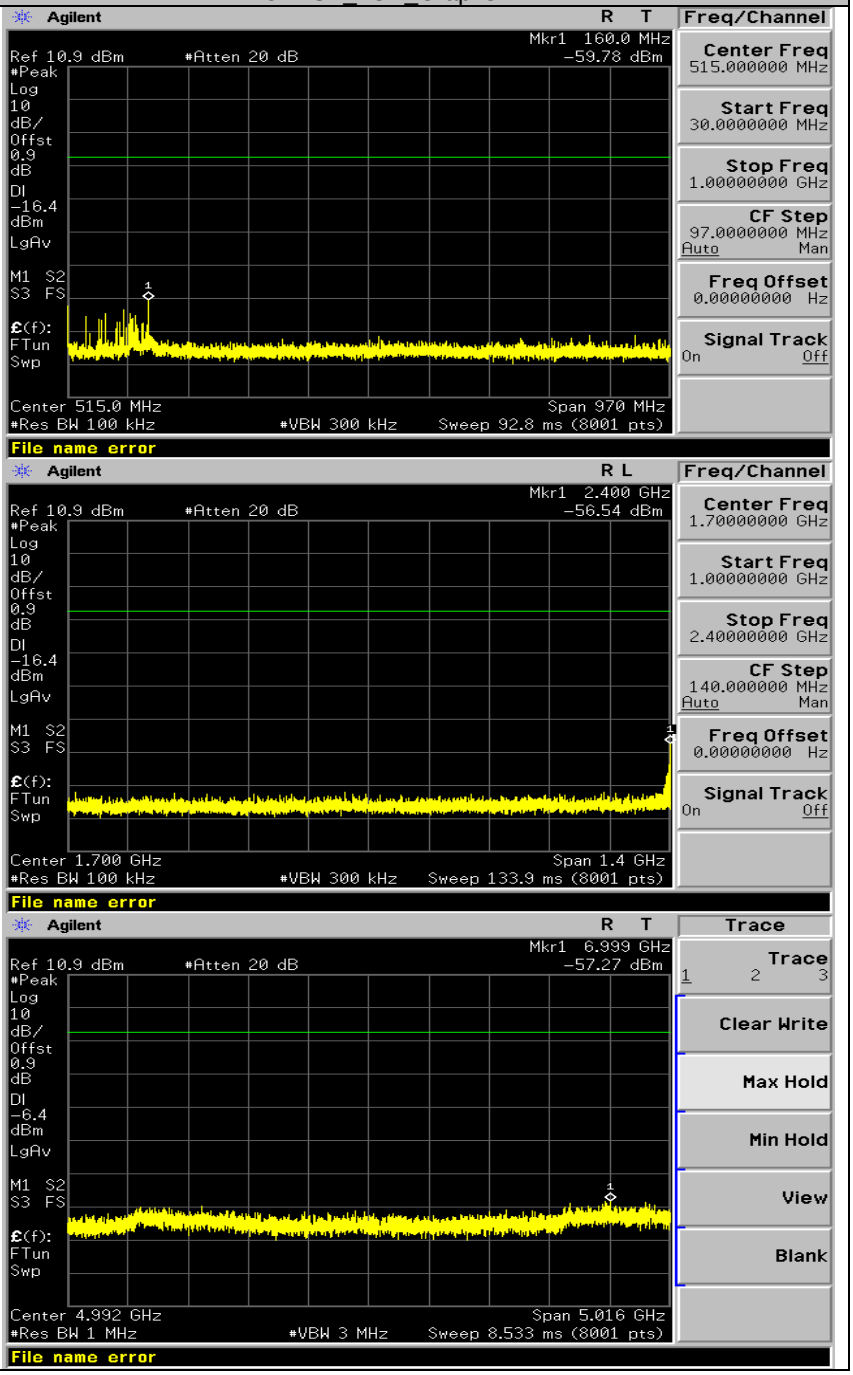

Agilent
R L
Trace
Mkr1 13.624 GHz
Ref 10.9 dBm
#Atten 20 dB
-56.44 dBm
#Peak
Log
10
dB/
Offst
0.9
dB
Dl
-6.7
dBm
LgAv
M1 S2
S3 FS
£(f):
FTun
Swp
Center 11.250 GHz
Span 7.5 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 15.47 ms (8001 pts)
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
File name error
Agilent
R L
Trace
Mkr1 19.088 GHz
Ref 10.9 dBm
#Atten 20 dB
-55.96 dBm
#Peak
Log
10
dB/
Offst
0.9
dB
Dl
-6.7
dBm
LgAv
M1 S2
S3 FS
£(f):
FTun
Swp
Center 17.500 GHz
Span 5 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 12.8 ms (8001 pts)
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
File name error
Agilent
R L
Trace
Mkr1 24.999 GHz
Ref 10.9 dBm
#Atten 20 dB
-53.10 dBm
#Peak
Log
10
dB/
Offst
0.9
dB
Dl
-6.7
dBm
LgAv
M1 S2
S3 FS
£(f):
FTun
Swp
Center 22.500 GHz
Span 5 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 12.8 ms (8001 pts)
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
File name error

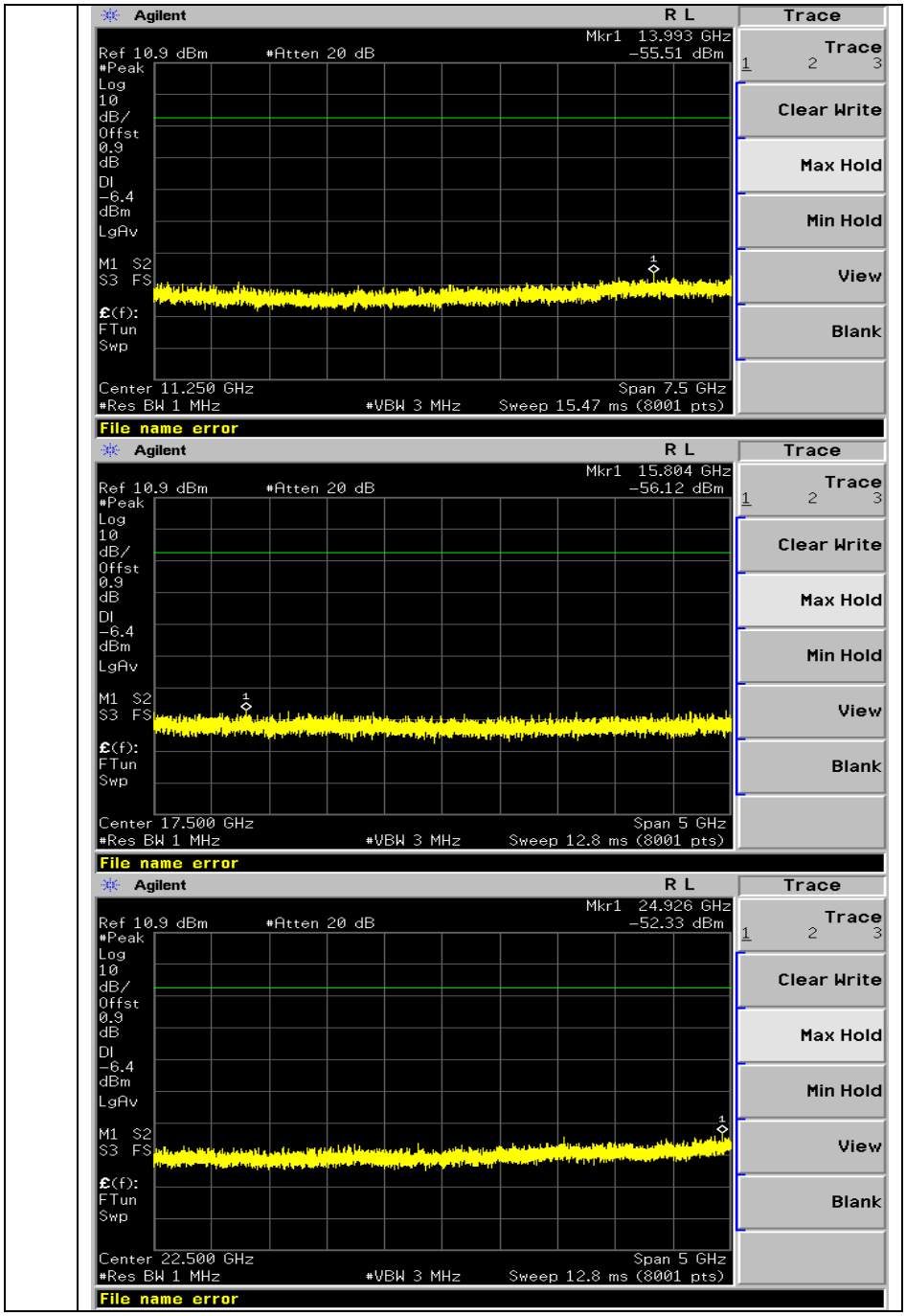
π/4DQPSK_MCH_Graphs	
Puw	

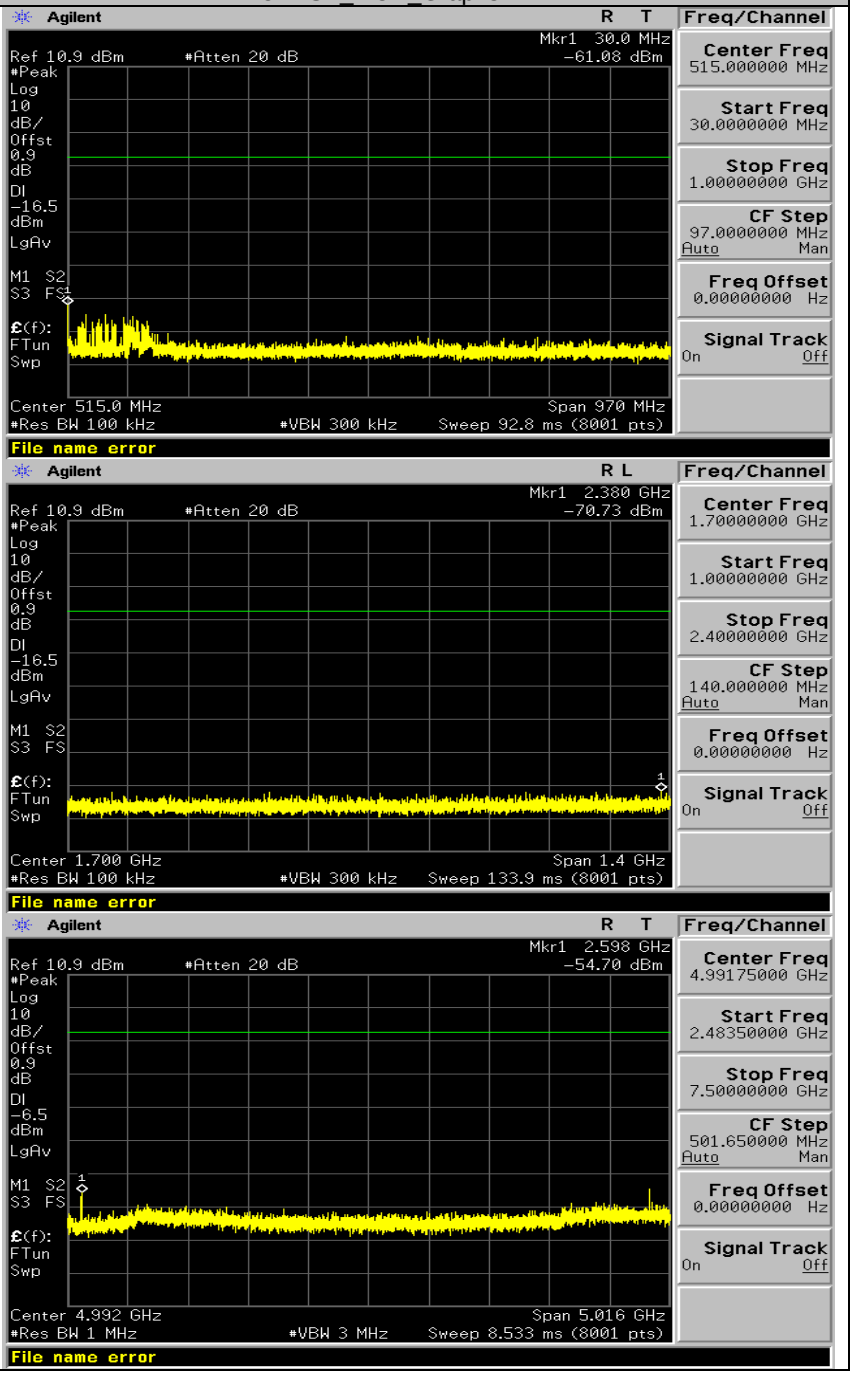

Agilent
R L
Trace
Mkr1 13.826 GHz
Ref 10.9 dBm
#Atten 20 dB
-56.18 dBm
#Peak
Log
10
dB/
Offst
0.9
dB
Dl
-6.4
dBm
LgAv
M1 S2
S3 FS
£(f):
FTun
Swp
Center 11.250 GHz
Span 7.5 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 15.47 ms (8001 pts)
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
File name error
Agilent
R L
Trace
Mkr1 15.772 GHz
Ref 10.9 dBm
#Atten 20 dB
-56.08 dBm
#Peak
Log
10
dB/
Offst
0.9
dB
Dl
-6.4
dBm
LgAv
M1 S2
S3 FS
£(f):
FTun
Swp
Center 17.500 GHz
Span 5 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 12.8 ms (8001 pts)
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
File name error
Agilent
R L
Trace
Mkr1 24.879 GHz
Ref 10.9 dBm
#Atten 20 dB
-52.63 dBm
#Peak
Log
10
dB/
Offst
0.9
dB
Dl
-6.4
dBm
LgAv
M1 S2
S3 FS
£(f):
FTun
Swp
Center 22.500 GHz
Span 5 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 12.8 ms (8001 pts)
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
File name error

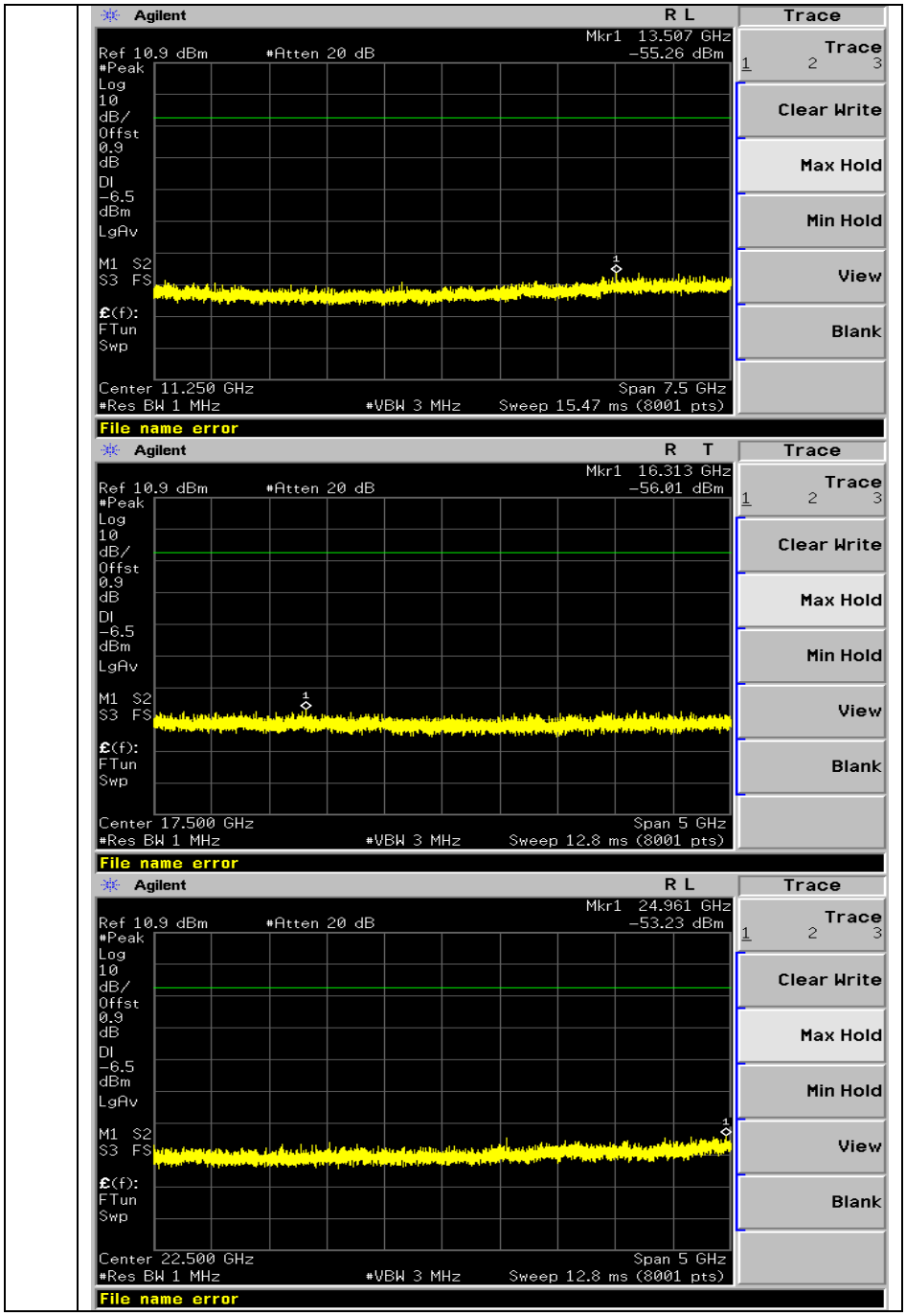
π/4DQPSK_HCH_Graphs	
Puw	

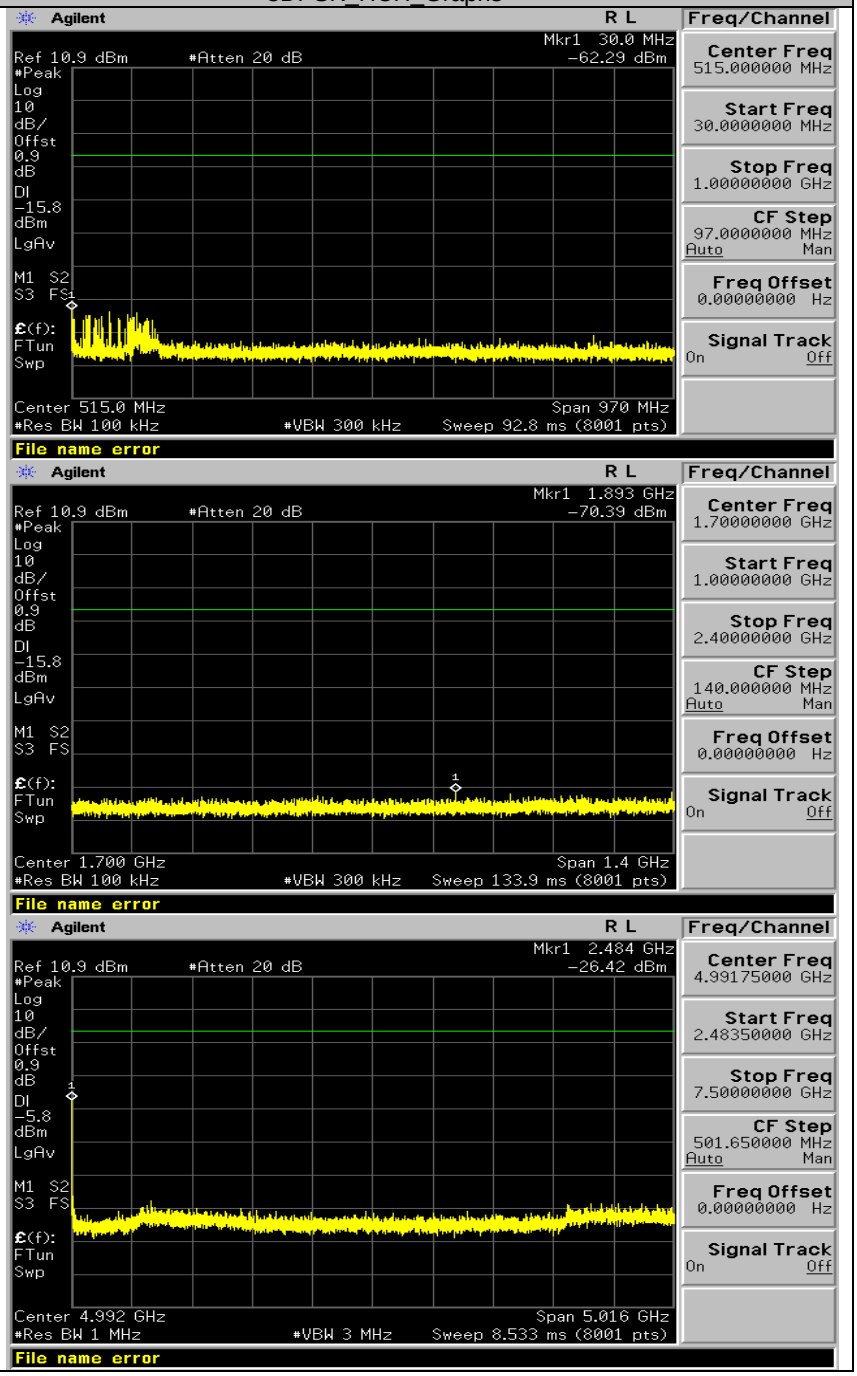

Agilent
R L
Trace
Mkr1 13.728 GHz
Ref 10.9 dBm
#Atten 20 dB
-55.52 dBm
#Peak
Log
10
dB/
Offst
0.9
dB
Dl
-6.2
dBm
LgAv
M1 S2
S3 FS
£(f):
FTun
Swp
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
Center 11.250 GHz
Span 7.5 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 15.47 ms (8001 pts)
File name error
Agilent
R T
Trace
Mkr1 18.994 GHz
Ref 10.9 dBm
#Atten 20 dB
-55.82 dBm
#Peak
Log
10
dB/
Offst
0.9
dB
Dl
-6.2
dBm
LgAv
M1 S2
S3 FS
£(f):
FTun
Swp
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
Center 17.500 GHz
Span 5 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 12.8 ms (8001 pts)
File name error
Agilent
R L
Trace
Mkr1 24.966 GHz
Ref 10.9 dBm
#Atten 20 dB
-53.33 dBm
#Peak
Log
10
dB/
Offst
0.9
dB
Dl
-6.2
dBm
LgAv
M1 S2
S3 FS
£(f):
FTun
Swp
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
Center 22.500 GHz
Span 5 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 12.8 ms (8001 pts)
File name error

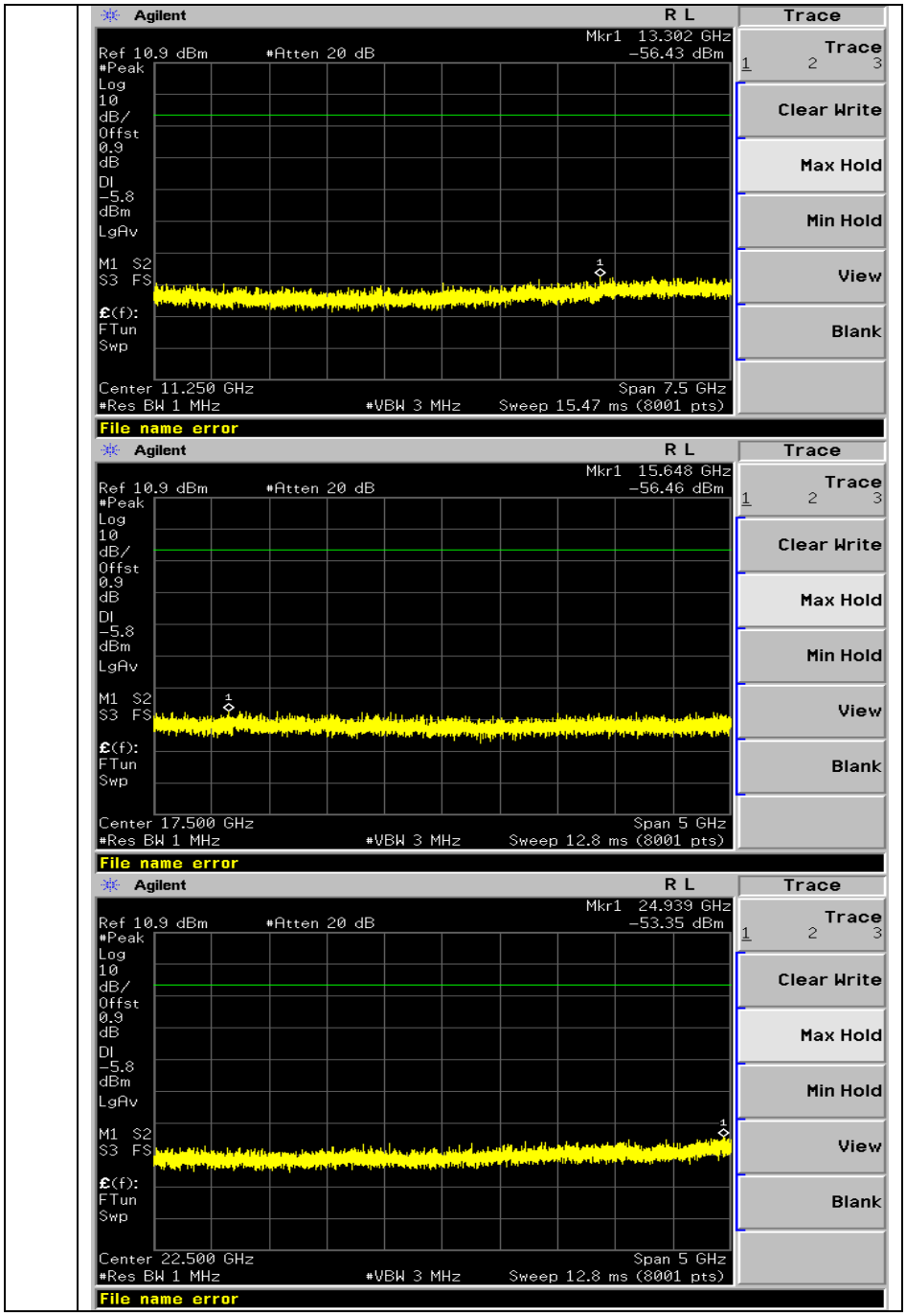
8DPSK_LCH_Graphs	
Puw	


Agilent
R L
Trace
Mkr1 13.993 GHz
Ref 10.9 dBm
#Atten 20 dB
-55.51 dBm
#Peak
Log
10
dB/
Offst
0.9
dB
Dl
-6.4
dBm
LgAv
M1 S2
S3 FS
£(f):
FTun
Swp
Center 11.250 GHz
Span 7.5 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 15.47 ms (8001 pts)
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
File name error
Agilent
R L
Trace
Mkr1 15.804 GHz
Ref 10.9 dBm
#Atten 20 dB
-56.12 dBm
#Peak
Log
10
dB/
Offst
0.9
dB
Dl
-6.4
dBm
LgAv
M1 S2
S3 FS
£(f):
FTun
Swp
Center 17.500 GHz
Span 5 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 12.8 ms (8001 pts)
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
File name error
Agilent
R L
Trace
Mkr1 24.926 GHz
Ref 10.9 dBm
#Atten 20 dB
-52.33 dBm
#Peak
Log
10
dB/
Offst
0.9
dB
Dl
-6.4
dBm
LgAv
M1 S2
S3 FS
£(f):
FTun
Swp
Center 22.500 GHz
Span 5 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 12.8 ms (8001 pts)
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
File name error

8DPSK_MCH_Graphs	
Puw	


Agilent
R L
Trace
Mkr1 13.507 GHz
Ref 10.9 dBm
#Atten 20 dB
-55.26 dBm
#Peak
Log
10
dB/
Offst
0.9
dB
Dl
-6.5
dBm
LgAv
M1 S2
S3 FS
£(f):
FTun
Swp
Center 11.250 GHz
Span 7.5 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 15.47 ms (8001 pts)
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
File name error
Agilent
R T
Trace
Mkr1 16.313 GHz
Ref 10.9 dBm
#Atten 20 dB
-56.01 dBm
#Peak
Log
10
dB/
Offst
0.9
dB
Dl
-6.5
dBm
LgAv
M1 S2
S3 FS
£(f):
FTun
Swp
Center 17.500 GHz
Span 5 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 12.8 ms (8001 pts)
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
File name error
Agilent
R L
Trace
Mkr1 24.961 GHz
Ref 10.9 dBm
#Atten 20 dB
-53.23 dBm
#Peak
Log
10
dB/
Offst
0.9
dB
Dl
-6.5
dBm
LgAv
M1 S2
S3 FS
£(f):
FTun
Swp
Center 22.500 GHz
Span 5 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 12.8 ms (8001 pts)
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
File name error

8DPSK_HCH_Graphs	
Puw	


Agilent
R L
Trace
Mkr1 13.302 GHz
Ref 10.9 dBm
#Atten 20 dB
-56.43 dBm
#Peak
Log
10
dB/
Offst
0.9
dB
Dl
-5.8
dBm
LgAv
M1 S2
S3 FS
£(f):
FTun
Swp
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
Center 11.250 GHz
Span 7.5 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 15.47 ms (8001 pts)
File name error
Agilent
R L
Trace
Mkr1 15.648 GHz
Ref 10.9 dBm
#Atten 20 dB
-56.46 dBm
#Peak
Log
10
dB/
Offst
0.9
dB
Dl
-5.8
dBm
LgAv
M1 S2
S3 FS
£(f):
FTun
Swp
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
Center 17.500 GHz
Span 5 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 12.8 ms (8001 pts)
File name error
Agilent
R L
Trace
Mkr1 24.939 GHz
Ref 10.9 dBm
#Atten 20 dB
-53.35 dBm
#Peak
Log
10
dB/
Offst
0.9
dB
Dl
-5.8
dBm
LgAv
M1 S2
S3 FS
£(f):
FTun
Swp
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
Center 22.500 GHz
Span 5 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 12.8 ms (8001 pts)
File name error

10. RADIATED EMISSION

10.1. MEASUREMENT PROCEDURE

1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.

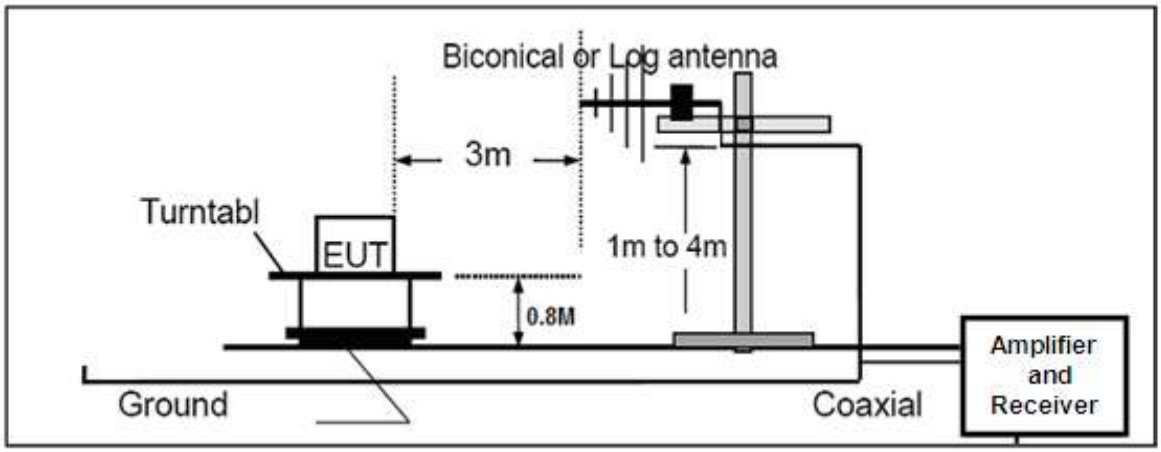
The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP
Start ~Stop Frequency	1GHz~26.5GHz 1MHz/1MHz for Peak, 1MHz/10Hz for Average

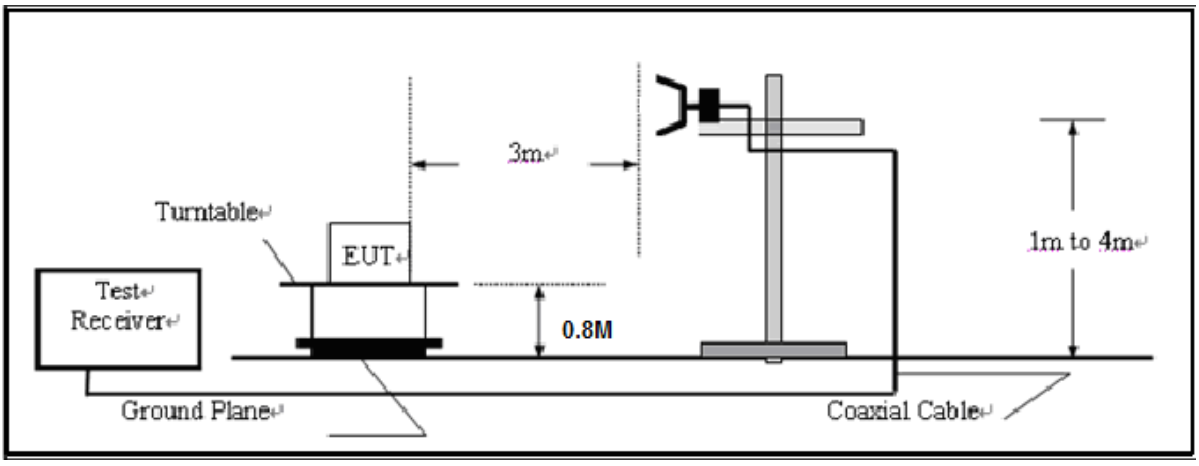
Receiver Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP

10.2. TEST SETUP

RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



10.3. TEST RESULT

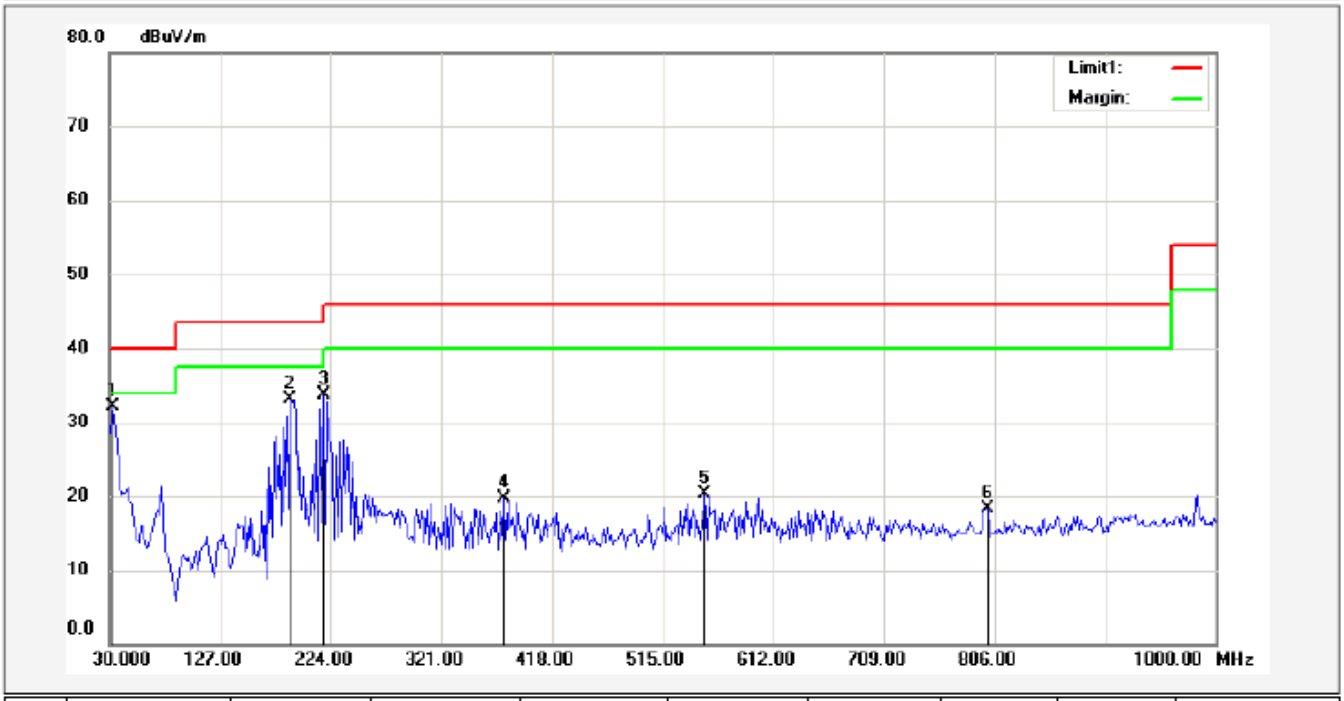
RADIATED EMISSION BELOW 30MHZ

No emission found between lowest internal used/generated frequencies to 30MHz.

RADIATED EMISSION BELOW 1GHZ

Job No.: 20150422	Probe : Horizontal
Standard: FCC Part15 Class B (30-1000MHz)	Tested Distance: 3m
Test item: Radiation Test	Power Source: DC 3V
Temp.(C)/Hum.(%RH): 24 (C) / 52 %RH	Date: 2015-4-22 Time: 17:34:14
Company:	EUT:
Model: Freedom	Test By : JIMMY

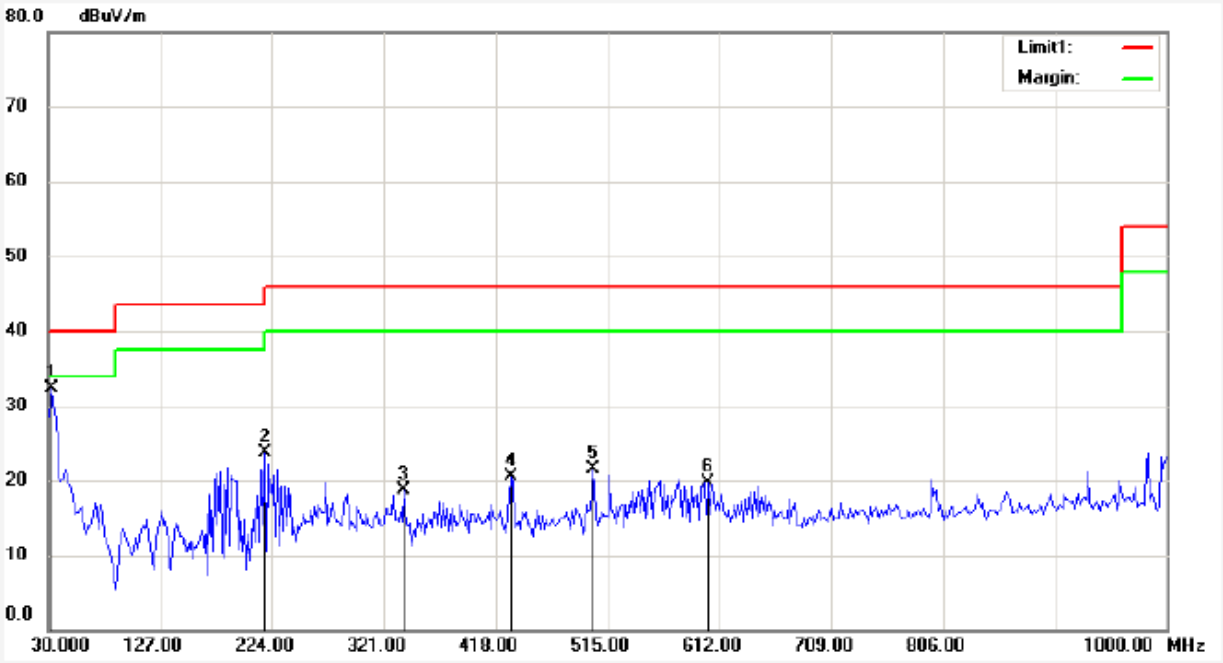
Test Mode: BT 1M TX 2402



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1*	33.2333	45.71	-13.64	32.07	40.00	-7.93	---	---	peak
2	188.4333	56.07	-22.87	33.20	43.50	-10.30	---	---	peak
3	217.5333	54.41	-20.64	33.77	46.00	-12.23	---	---	peak
4	375.9667	36.55	-16.77	19.78	46.00	-26.22	---	---	peak
5	552.1833	33.53	-13.13	20.40	46.00	-25.60	---	---	peak
6	799.5333	29.44	-11.12	18.32	46.00	-27.68	---	---	peak

Job No.:	20150422	Probe :	Vertical
Standard:	FCC Part15 Class B (30-1000MHz)	Tested Distance:	3m
Test item:	Radiation Test	Power Source:	DC 3V
Temp.(C)/Hum.(%RH):	24 (C) / 52 %RH	Date: 2015-4-22	Time: 17:33:36
Company:		EUT:	
Model:	Freedom	Test By :	JIMMY

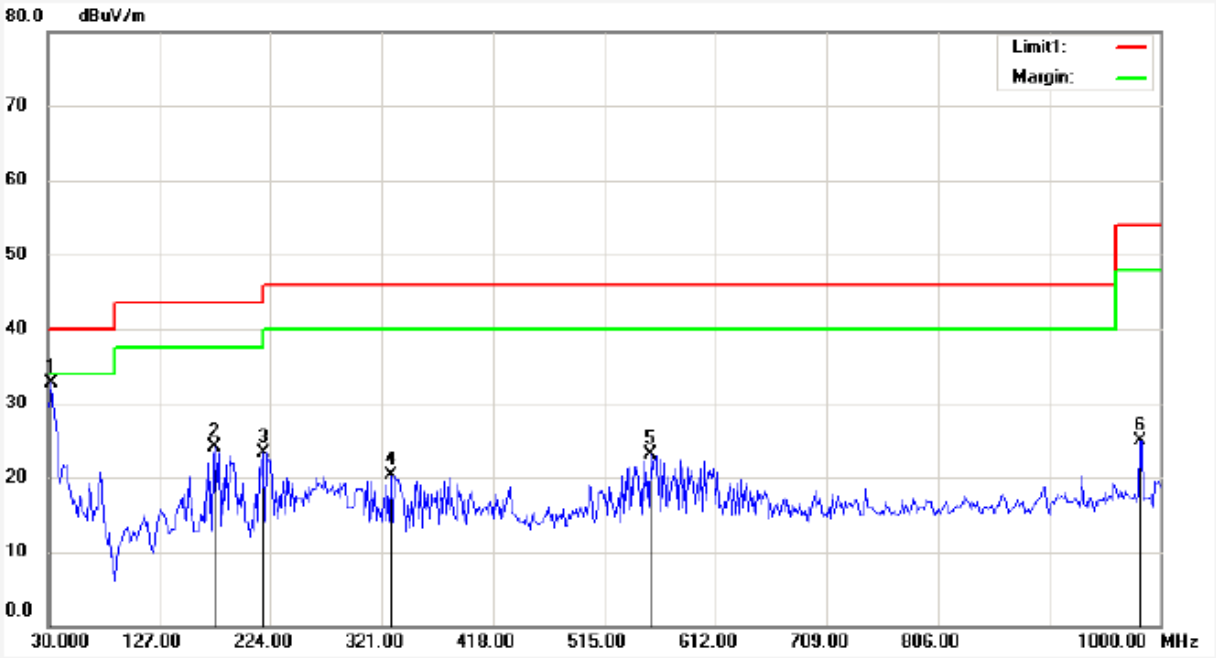
Test Mode: BT 1M TX 2402



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1*	33.2333	45.91	-13.64	32.27	40.00	-7.73	---	---	peak
2	217.5333	44.26	-20.64	23.62	46.00	-22.38	---	---	peak
3	338.7833	36.96	-18.18	18.78	46.00	-27.22	---	---	peak
4	430.9333	36.03	-15.60	20.43	46.00	-25.57	---	---	peak
5	502.0667	35.79	-14.34	21.45	46.00	-24.55	---	---	peak
6	602.3000	32.55	-12.81	19.74	46.00	-26.26	---	---	peak

Job No.:	20150422	Probe :	Horizontal
Standard:	FCC Part15 Class B (30-1000MHz)	Tested Distance:	3m
Test item:	Radiation Test	Power Source:	DC 3V
Temp.(C)/Hum.(%RH):	24 (C) / 52 %RH	Date: 2015-4-22	Time: 17:35:29
Company:		EUT:	
Model:	Freedom	Test By :	JIMMY

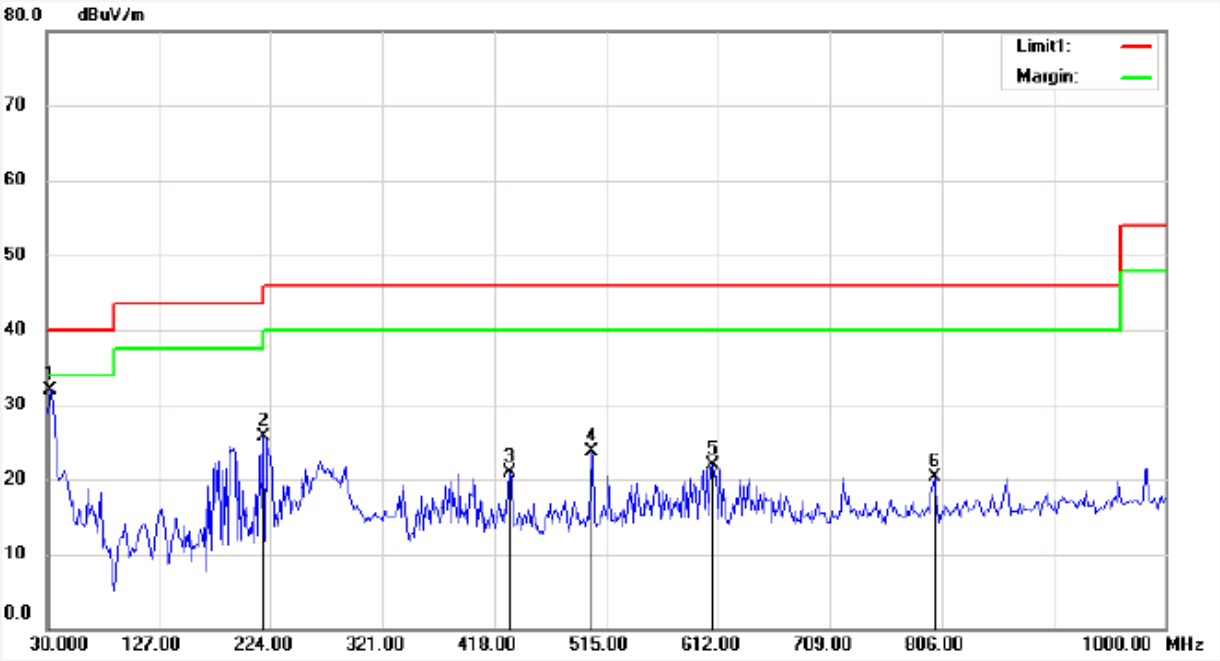
Test Mode: BT 1M TX 2441



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1*	33.2333	46.35	-13.64	32.71	40.00	-7.29	---	---	peak
2	175.5000	47.02	-22.94	24.08	43.50	-19.42	---	---	peak
3	217.5333	43.89	-20.64	23.25	46.00	-22.75	---	---	peak
4	329.0833	38.76	-18.45	20.31	46.00	-25.69	---	---	peak
5	555.4167	36.32	-13.19	23.13	46.00	-22.87	---	---	peak
6	982.2167	34.15	-9.23	24.92	54.00	-29.08	---	---	peak

Job No.: 20150422	Probe : Vertical
Standard: FCC Part15 Class B (30-1000MHz)	Tested Distance: 3m
Test item: Radiation Test	Power Source: DC 3V
Temp.(C)/Hum.(%RH): 24 (C) / 52 %RH	Date: 2015-4-22 Time: 17:36:14
Company:	EUT:
Model: Freedom	Test By : JIMMY

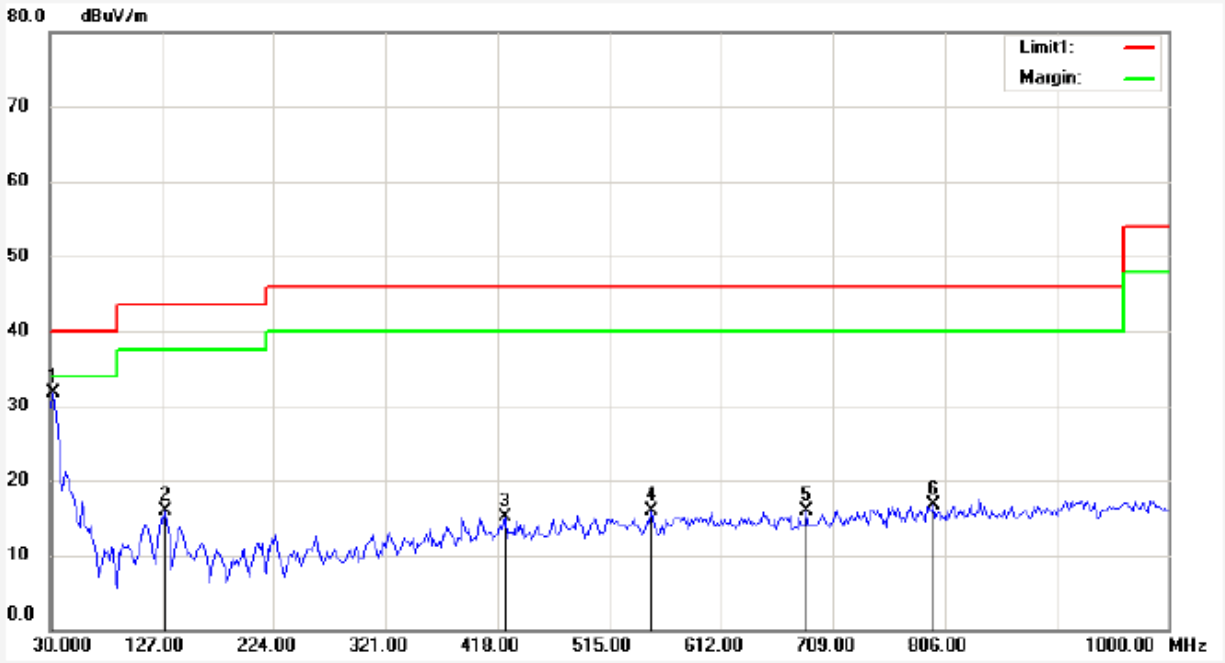
Test Mode: BT 1M TX 2441



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1*	33.2333	45.50	-13.64	31.86	40.00	-8.14	---	---	peak
2	217.5333	46.44	-20.64	25.80	46.00	-20.20	---	---	peak
3	430.9333	36.53	-15.60	20.93	46.00	-25.07	---	---	peak
4	502.0667	37.97	-14.34	23.63	46.00	-22.37	---	---	peak
5	607.1500	34.50	-12.68	21.82	46.00	-24.18	---	---	peak
6	799.5333	31.35	-11.12	20.23	46.00	-25.77	---	---	peak

Job No.: 20150422	Probe : Horizontal
Standard: FCC Part15 Class B (30-1000MHz)	Tested Distance: 3m
Test item: Radiation Test	Power Source: DC 3V
Temp.(C)/Hum.(%RH): 24 (C) / 52 %RH	Date: 2015-4-22 Time: 17:37:57
Company:	EUT:
Model: Freedom	Test By : JIMMY

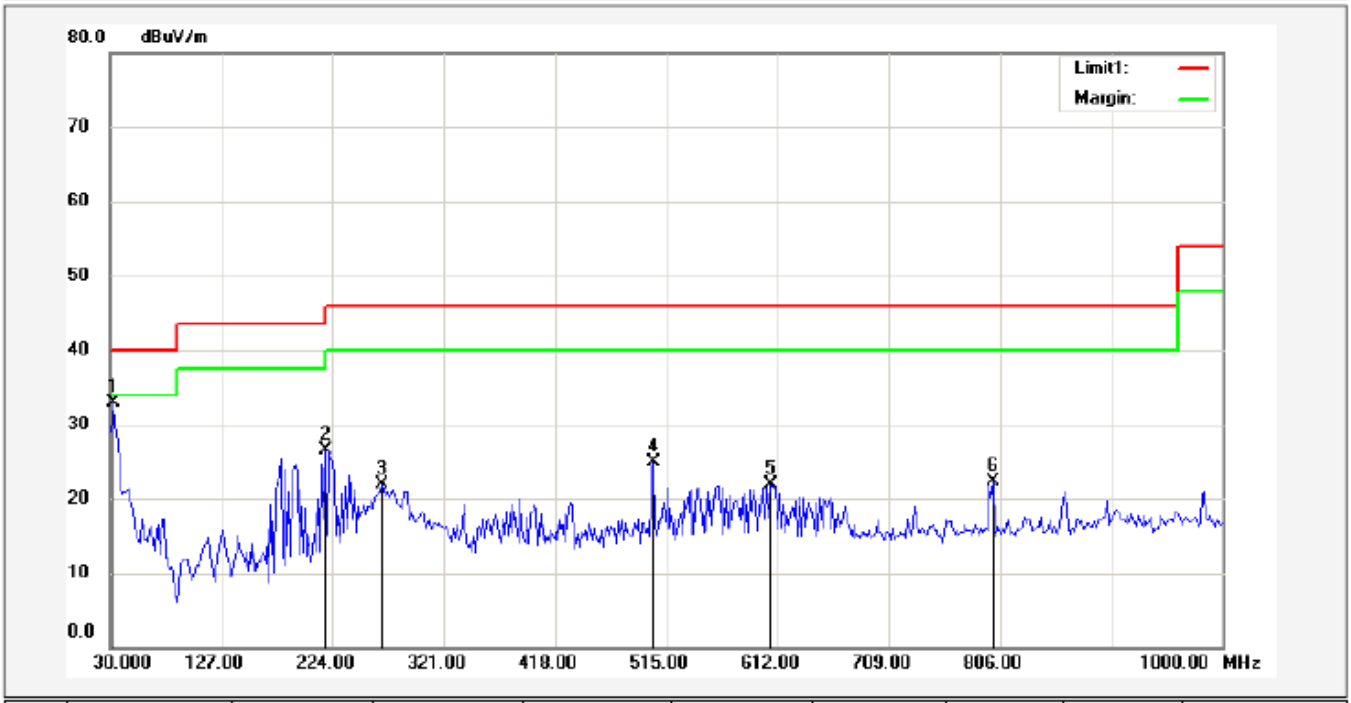
Test Mode: BT 1M TX 2480



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1*	33.2333	45.28	-13.64	31.64	40.00	-8.36	---	---	peak
2	130.2333	36.71	-20.76	15.95	43.50	-27.55	---	---	peak
3	424.4667	30.66	-15.50	15.16	46.00	-30.84	---	---	peak
4	552.1833	29.09	-13.13	15.96	46.00	-30.04	---	---	peak
5	686.3667	28.24	-12.28	15.96	46.00	-30.04	---	---	peak
6	796.3000	27.86	-11.14	16.72	46.00	-29.28	---	---	peak

Job No.:	20150422	Probe :	Vertical
Standard:	FCC Part15 Class B (30-1000MHz)	Tested Distance:	3m
Test item:	Radiation Test	Power Source:	DC 3V
Temp.(C)/Hum.(%RH):	24 (C) / 52 %RH	Date: 2015-4-22	Time: 17:37:02
Company:		EUT:	
Model:	Freedom	Test By :	JIMMY

Test Mode: BT 1M TX 2480



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1*	33.2333	46.55	-13.64	32.91	40.00	-7.09	---	---	peak
2	217.5333	47.14	-20.64	26.50	46.00	-19.50	---	---	peak
3	267.6500	42.28	-20.36	21.92	46.00	-24.08	---	---	peak
4	503.6833	39.16	-14.32	24.84	46.00	-21.16	---	---	peak
5	605.5333	34.60	-12.73	21.87	46.00	-24.13	---	---	peak
6	799.5333	33.40	-11.12	22.28	46.00	-23.72	---	---	peak

RESULT: PASS

Note: 1. Factor=Antenna Factor + Cable loss, Margin=Result-Limit.

2. The “Factor” value can be calculated automatically by software of measurement system.

3. 30MHz~25GHz:(Scan with GFSK, π/4-DQPSK,8DPSK, the worst casw is GFSK Mode)

RADIATED EMISSION TEST- (ABOVE 1GHZ)

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector	Comment
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	Type	
Low Channel (2402 MHz)							
4804.264	66.45	-3.62	62.83	74	-11.17	Pk	Vertical
4804.272	47.46	-3.62	43.84	54	-10.16	AV	Vertical
7206.138	63.31	-0.9	62.41	74	-11.59	pk	Vertical
7206.156	42.76	-0.9	41.86	54	-12.14	AV	Vertical
4803.959	63.88	-3.64	60.24	74	-13.76	Pk	Horizontal
4803.964	45.74	-3.64	42.10	54	-11.90	AV	Horizontal
Mid Channel (2441 MHz)							
4882.128	66.42	-3.65	62.77	74	-11.23	Pk	Vertical
4882.094	51.86	-3.65	48.21	54	-5.79	AV	Vertical
7323.228	62.22	-0.82	61.40	74	-12.60	Pk	Vertical
7323.220	45.87	-0.82	45.05	54	-8.95	AV	Vertical
4882.096	62.11	-3.68	58.43	74	-15.57	Pk	Horizontal
4882.171	46.76	-3.68	43.08	54	-10.92	AV	Horizontal
High Channel (2480 MHz)							
4960.260	62.32	-3.59	58.73	74	-15.27	pk	Vertical
4960.325	45.71	-3.59	42.12	54	-11.88	AV	Vertical
4960.190	64.32	-3.59	60.73	74	-13.27	pk	Horizontal
4960.157	46.66	-3.59	43.07	54	-10.93	AV	Horizontal

Note:

1) 30MHz~25GHz:(Scan with GFSK, π/4-DQPSK,8DPSK, the worst casw is GFSK Mode)
2) Factor = Antenna Factor + Cable Loss – Pre-amplifier.
   Emission Level = Meter Reading + Factor
   Margin = Emission Leve - Limit

RESULT: PASS

11. BAND EDGE EMISSION

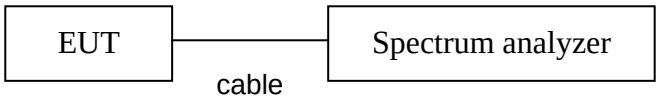
11.1. MEASUREMENT PROCEDURE

1. The transmitter output is connected to a spectrum analyzer.The resolution bandwidth is set to 100kHz.The video bandwidth is set to 300kHz.
2. Transmitter set to the normal hopping mode at 2.4 and 2.4835 GHz.

11.2. TEST SET-UP

Radiated same as 10.2

Conducted set up



11.3. Radiated TEST RESULT

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type	Comment
GFSK							
2399.9	69.56	-12.99	56.57	74	-17.43	peak	Vertical
2399.9	55.61	-12.99	42.62	54	-11.38	AVG	Vertical
2399.9	70.45	-12.99	57.46	74	-16.54	peak	Horizontal
2399.9	54.61	-12.99	41.62	54	-12.38	AVG	Horizontal
2483.6	71.29	-12.78	58.51	74	-15.49	peak	Vertical
2483.6	54.38	-12.78	41.6	54	-12.4	AVG	Vertical
2483.6	71.75	-12.78	58.97	74	-15.03	peak	Horizontal
2483.6	54.26	-12.78	41.48	54	-12.52	AVG	Horizontal
π/4-DQPSK							
2399.9	71.66	-12.99	58.67	74	-15.33	peak	Vertical
2399.9	54.42	-12.99	41.43	54	-12.57	AVG	Vertical
2399.9	70.19	-12.99	57.2	74	-16.8	peak	Horizontal
2399.9	55.75	-12.99	42.76	54	-11.24	AVG	Horizontal
2483.6	71.39	-12.78	58.61	74	-15.39	peak	Vertical
2483.6	56.58	-12.78	43.8	54	-10.2	AVG	Vertical
2483.6	71.73	-12.78	58.95	74	-15.05	peak	Horizontal
2483.6	54.86	-12.78	42.08	54	-11.92	AVG	Horizontal
8DPSK							
2399.9	71.29	-12.99	58.3	74	-15.7	peak	Vertical
2399.9	55.67	-12.99	42.68	54	-11.32	AVG	Vertical
2399.9	70.83	-12.99	57.84	74	-16.16	peak	Horizontal
2399.9	56.12	-12.99	43.13	54	-10.87	AVG	Horizontal
2483.6	71.27	-12.78	58.49	74	-15.51	peak	Vertical
2483.6	55.39	-12.78	42.61	54	-11.39	AVG	Vertical
2483.6	71.75	-12.78	58.97	74	-15.03	peak	Horizontal
2483.6	54.81	-12.78	42.03	54	-11.97	AVG	Horizontal

RESULT: PASS

Note: Factor=Antenna Factor + Cable loss - Amplifier gain,

Emission Level = Meter Reading + Factor

Margin= Emission Level -Limit.

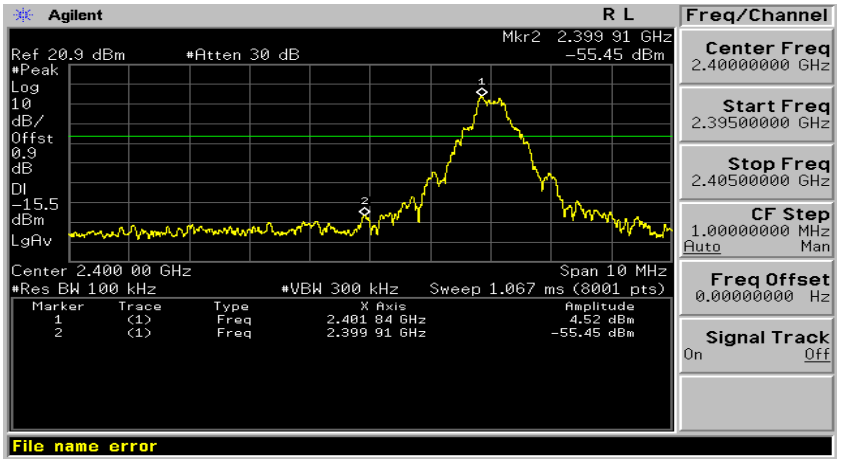
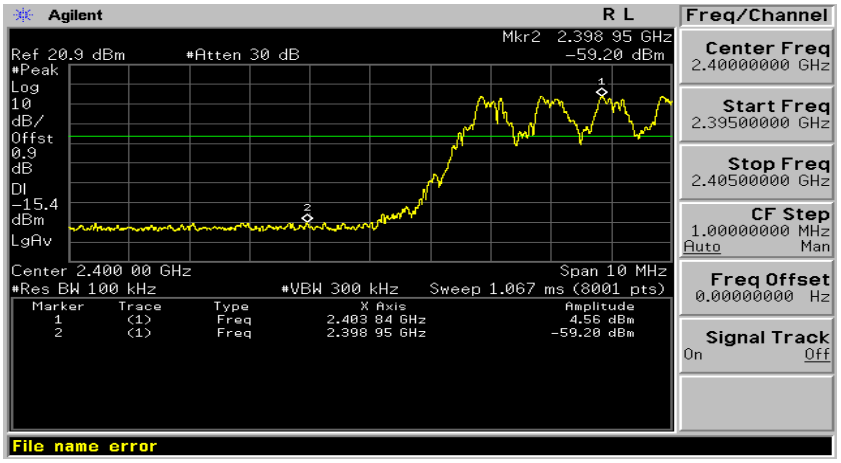
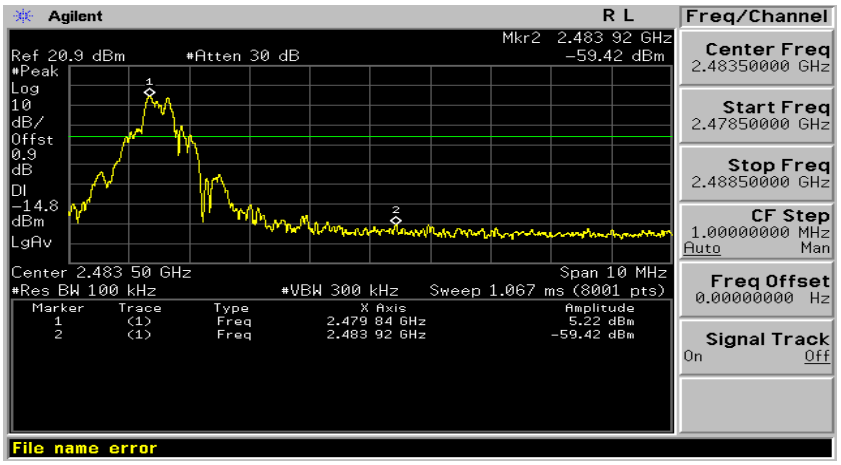
The “Factor” value can be calculated automatically by software of measurement system.

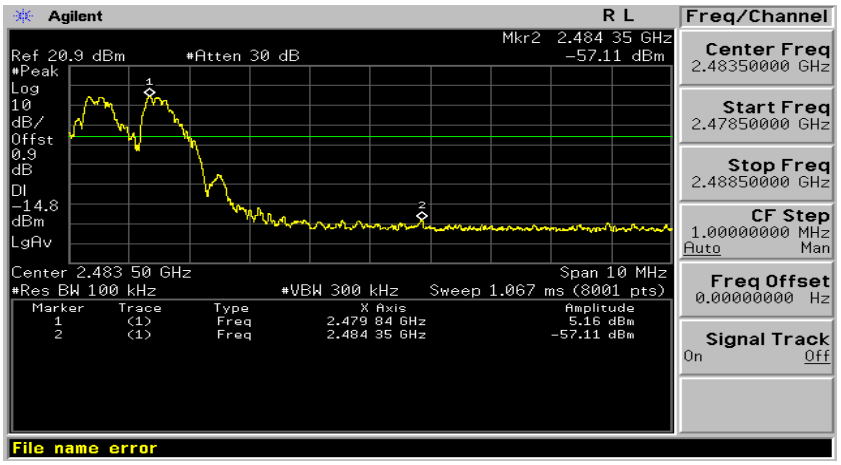
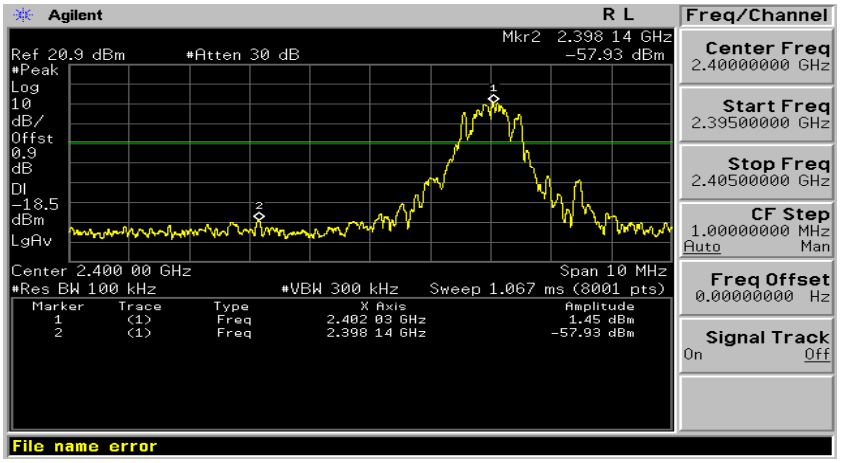
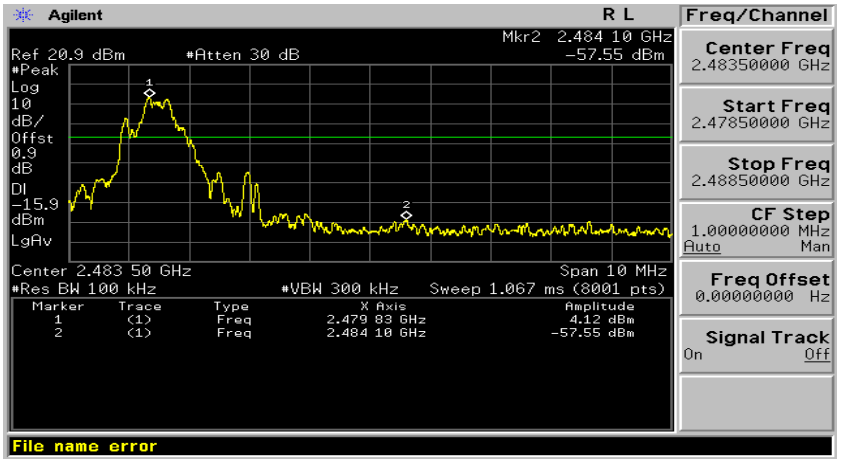
11.4 Conducted TEST RESULT

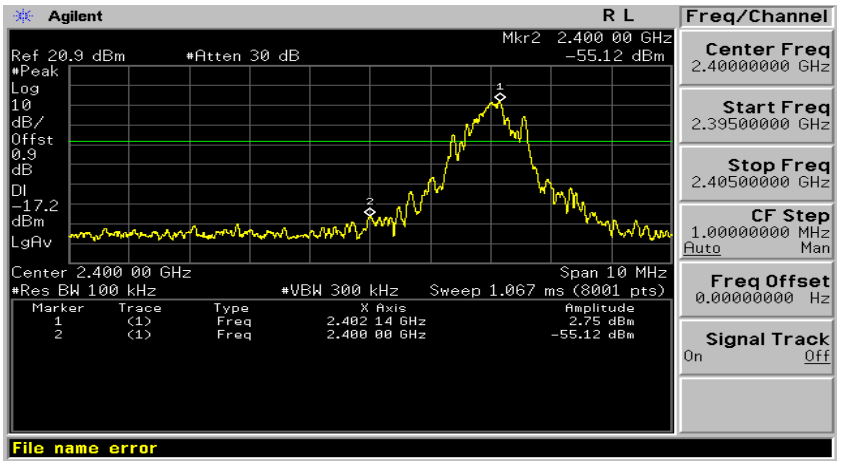
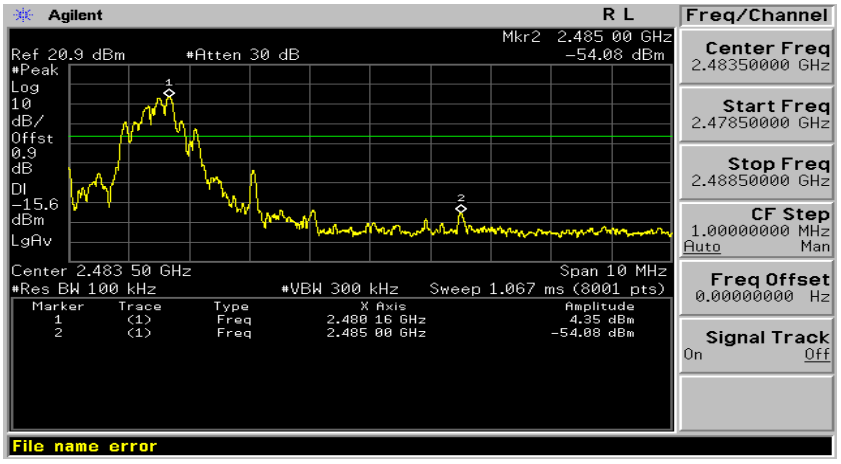
Mode	Channel	Carrier Frequency [MHz]	Frequency Hopping	Max Spurious Level [dBm]	Verdict
GFSK	LCH	2402	Off	-55.446	PASS
			On	-59.203	PASS
GFSK	HCH	2480	Off	-59.416	PASS
			On	-57.113	PASS
π/4DQPSK	LCH	2402	Off	-57.926	PASS
π/4DQPSK	HCH	2480	Off	-57.552	PASS
8DPSK	LCH	2402	Off	-55.121	PASS
8DPSK	HCH	2480	Off	-54.075	PASS

Note: All modes were tested, only the worst case record in the report.

Test Graph

Graphs	
GFSK/LCH/No Hop	
GFSK/LCH/Hop	
GFSK/HCH/No Hop	

GFSK/HCH/Hop	
π /4DQPSK/LCH/No Hop	
π /4DQPSK/HCH/No Hop	

8DPSK/LCH/No Hop	
8DPSK/HCH/No Hop	

12. NUMBER OF HOPPING FREQUENCY

12.1. MEASUREMENT PROCEDURE

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer Start = 2.4GHz Stop = 2.4835GHz
4. Set the Spectrum Analyzer as RBW>=1%span, VBW>=RBW.

12.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)

Same as described in section 8.2

12.3. MEASUREMENT EQUIPMENT USED

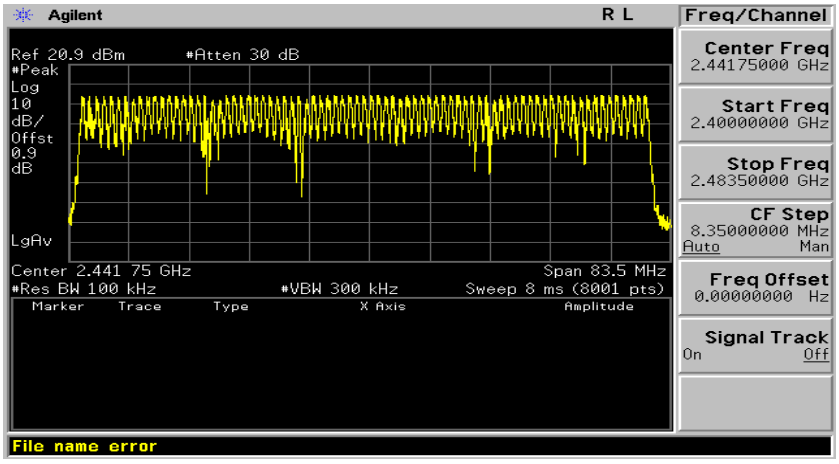
The same as described in section 6

12.4. LIMITS AND MEASUREMENT RESULT

Mode	Channel.	Number of Hopping Channel	Verdict
GFSK	Hop	79	PASS

Note: All modes were tested, only the worst case record in the report.

Test Graph

Graphs	
GFSK/Hop	

13. TIME OF OCCUPANCY (DWELL TIME)

13.1. MEASUREMENT PROCEDURE

1. Place the EUT on the table and set it in transmitting mode
2. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum analyzer.
3. Set Span = zero span, centered on a hoping channel
4. Set the spectrum analyzer as RBW=1MHz, VBW>=RBW, Span = 0 Hz

13.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)

Same as described in section 8.2

13.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6

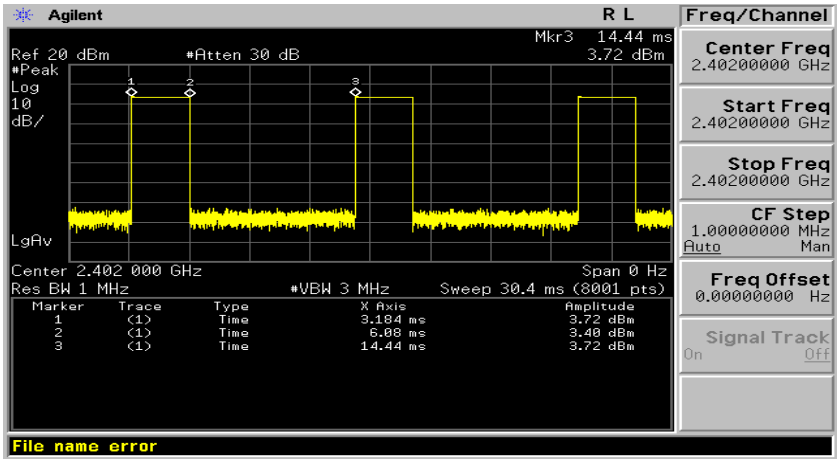
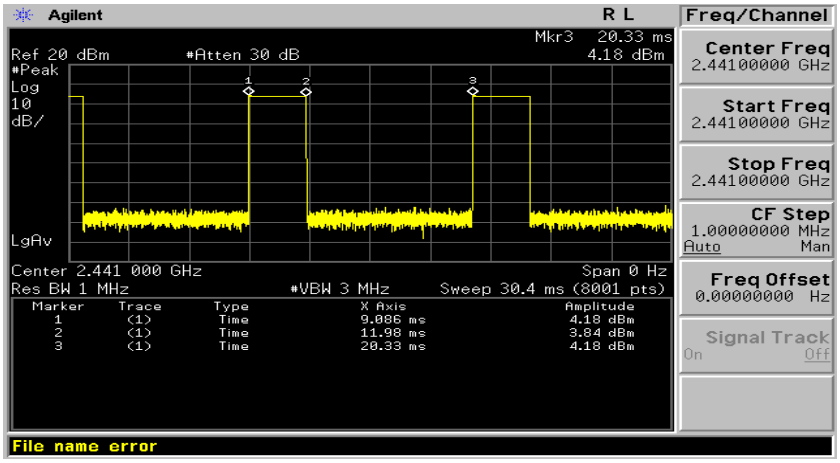
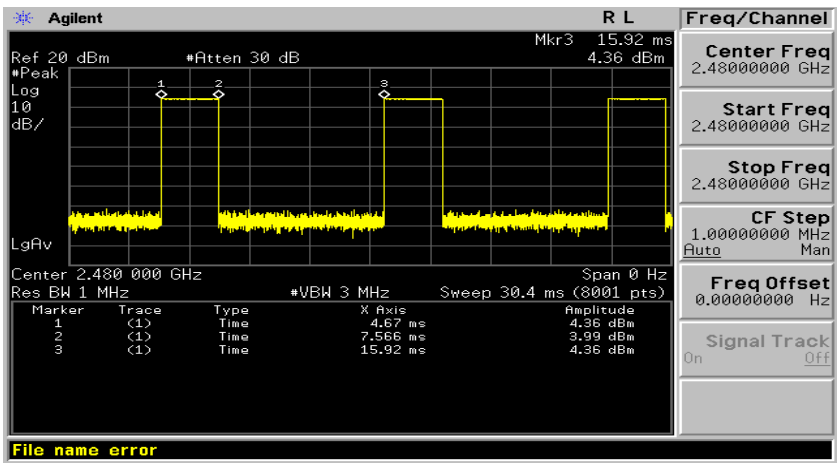
13.4. LIMITS AND MEASUREMENT RESULT

The Dwell Time=Burst Width*Total Hops. The detailed calculations are showed as follows:

- The duration for dwell time calculation:0.4[s]*hopping number=0.4[s]*79[ch]=31.6[s*ch];
- The burst width [ms/hop/ch], which is directly measured, refers to the duration on one channel hop.
- The hops per second for all channels: The selected EUT Conf uses a slot type of 5-Tx&1-Rx and a hopping rate of 1600 [ch*hop/s] for all channels. So the final hopping rate for all channels is 1600/6=266.67 [ch*hop/s]
- The hops per second on one channel: 266.67 [ch*hops/s]/79 [ch]=3.38 [hop/s];
- The total hops for all channels within the dwell time calculation duration:3.38 [hop/s]*31.6[s*ch]=106.67 [hop*ch];
- The dwell time for all channels hopping: 106.67 [hop*ch]*Burst Width [ms/hop/ch].

Mode	Channel.	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[ms]	Verdict	Limit (ms)
GFSK	LCH	2.896	106.67	309.872	PASS	400
GFSK	MCH	2.896	106.67	309.872	PASS	400
GFSK	HCH	2.896	106.67	309.872	PASS	400

Test Graph

Graphs	
GFSK/LCH	
GFSK/MCH	
GFSK/HCH	

14. FREQUENCY SEPARATION

14.1. MEASUREMENT PROCEDURE

1. Place the EUT on the table and set it in transmitting mode
2. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum analyzer
3. Set Span = wide enough to capture the peaks of two adjacent channels Resolution (or IF) Bandwidth (RBW) ≥ 1% of the span Video (or Average) Bandwidth (VBW) ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold

14.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)

Same as described in section 6.2

14.3. MEASUREMENT EQUIPMENT USED

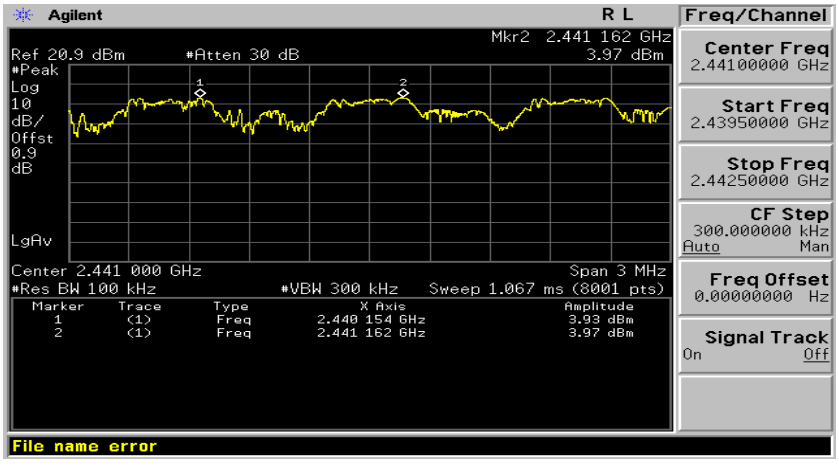
The same as described in section 6.3

14.4. LIMITS AND MEASUREMENT RESULT

Mode	Channel.	Carrier Frequency Separation [MHz]	Verdict
8DPSK	Hop	1.008	PASS

Note: All modes were tested, only the worst case record in the report.

Test Graph

Graphs	
8DPSK/Hop	

15. FCC LINE CONDUCTED EMISSION TEST

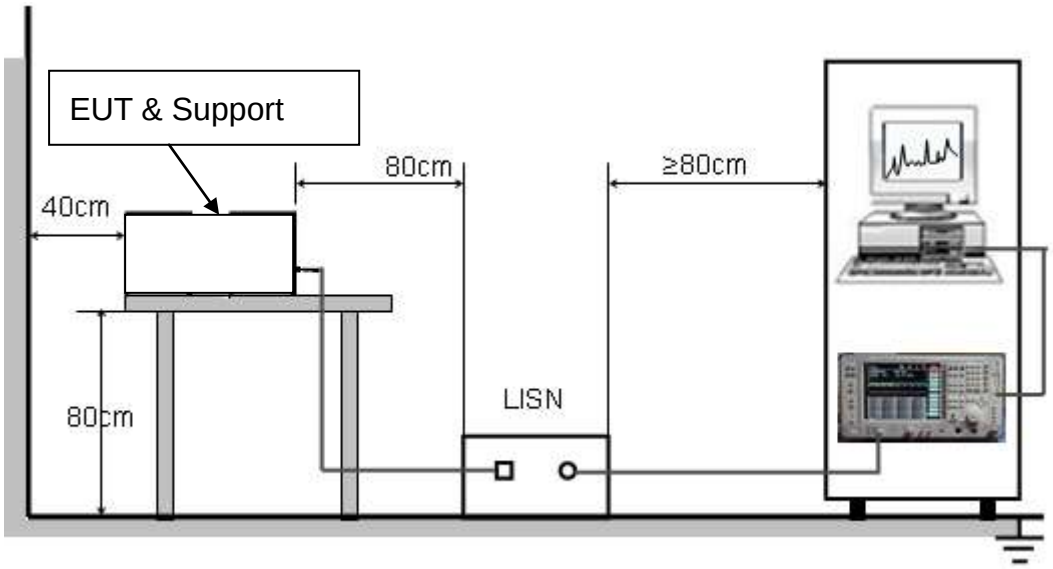
15.1. LIMITS OF LINE CONDUCTED EMISSION TEST

Frequency	Maximum RF Line Voltage	
	Q.P.(dBuV)	Average(dBuV)
150kHz~500kHz	66-56	56-46
500kHz~5MHz	56	46
5MHz~30MHz	60	50

Note:

1. The lower limit shall apply at the transition frequency.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

15.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST



15.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.4 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
2. Support equipment, if needed, was placed as per ANSI C63.4.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.
4. All support equipments received AC120V/60Hz power from a LISN, if any.
5. The EUT received DC charging voltage by adapter which received 120V/60Hzpower by a LISN..
6. The test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.
9. The test mode(s) were scanned during the preliminary test.

Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

15.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST

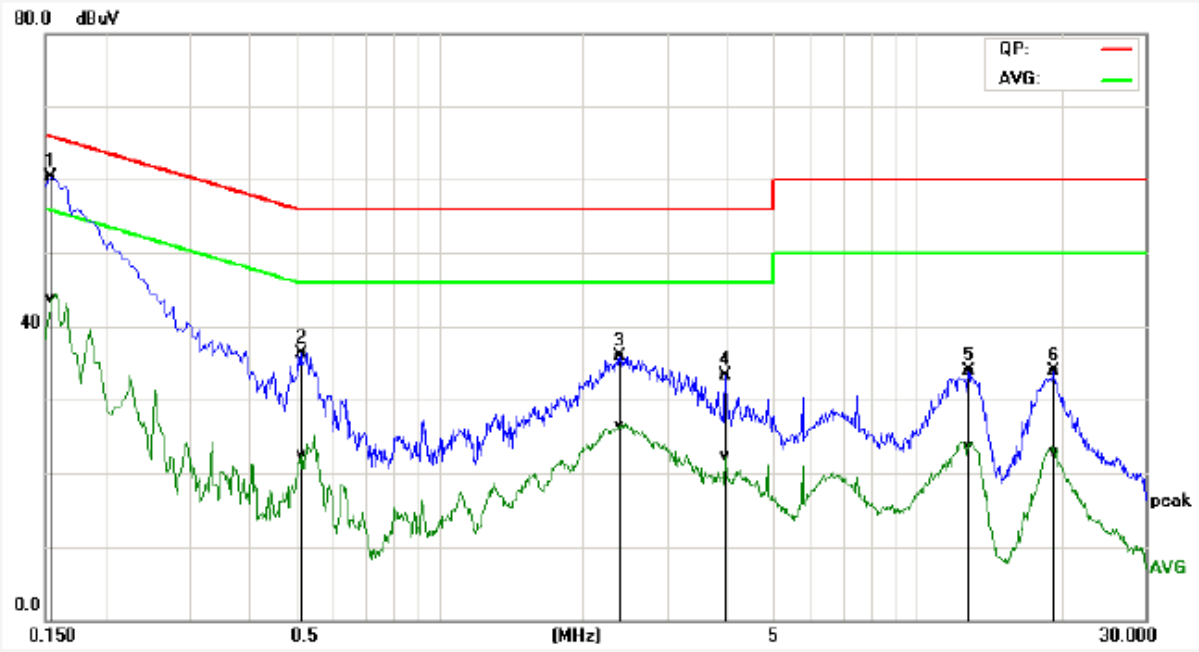
1. EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
2. A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less –2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.
3. The test data of the worst case condition(s) was reported on the Summary Data page.

15.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST

Line Conducted Emission Test Line 1-L

Job No.:	20150422	Date: 2015-4-22	
Company:		Time: 18:05:49	
Standard:	FCC Class B Conduction(QP)	Temp.(C)/Hum.(%):	26(C) / 60 %
Test item:	Conduction Test	EUT:	
Line :	L1	Test Voltage	AC 120V/60Hz
Model:	Freedom	Test By :	

Description: Normal Operating(BT3.0)

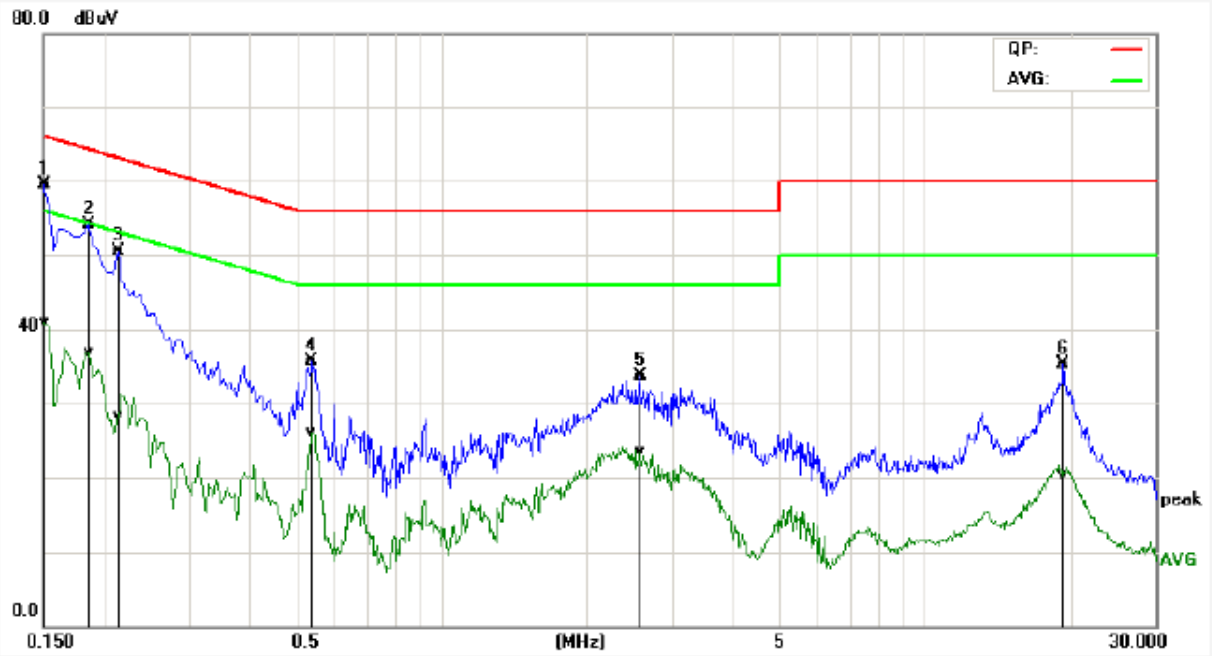


No.	Frequency (MHz)	QuasiPeak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	QuasiPeak result (dBuV)	Average result (dBuV)	QuasiPeak limit (dBuV)	Average limit (dBuV)	QuasiPeak margin (dB)	Average margin (dB)	Remark
1*	0.1539	50.74	34.03	9.59	60.33	43.62	65.78	55.79	-5.45	-12.17	Pass
2P	0.5140	26.56	12.75	9.69	36.25	22.44	56.00	46.00	-19.75	-23.56	Pass
3P	2.3940	26.24	16.73	9.73	35.97	26.46	56.00	46.00	-20.03	-19.54	Pass
4P	3.9780	23.61	12.69	9.69	33.30	22.38	56.00	46.00	-22.70	-23.62	Pass
5P	12.7940	24.03	13.88	9.89	33.92	23.77	60.00	50.00	-26.08	-26.23	Pass
6P	19.2300	24.03	13.11	9.85	33.88	22.96	60.00	50.00	-26.12	-27.04	Pass

Line Conducted Emission Test Line 2-N

Job No.:	20150422	Date: 2015-4-22	
Company:		Time: 18:09:03	
Standard:	FCC Class B Conduction(QP)	Temp.(C)/Hum.(%):	26(C) / 60 %
Test item:	Conduction Test	EUT:	
Line :	N	Test Voltage	AC 120V/60Hz
Model:	Freedom	Test By :	

Description: Normal Operating(BT3.0)

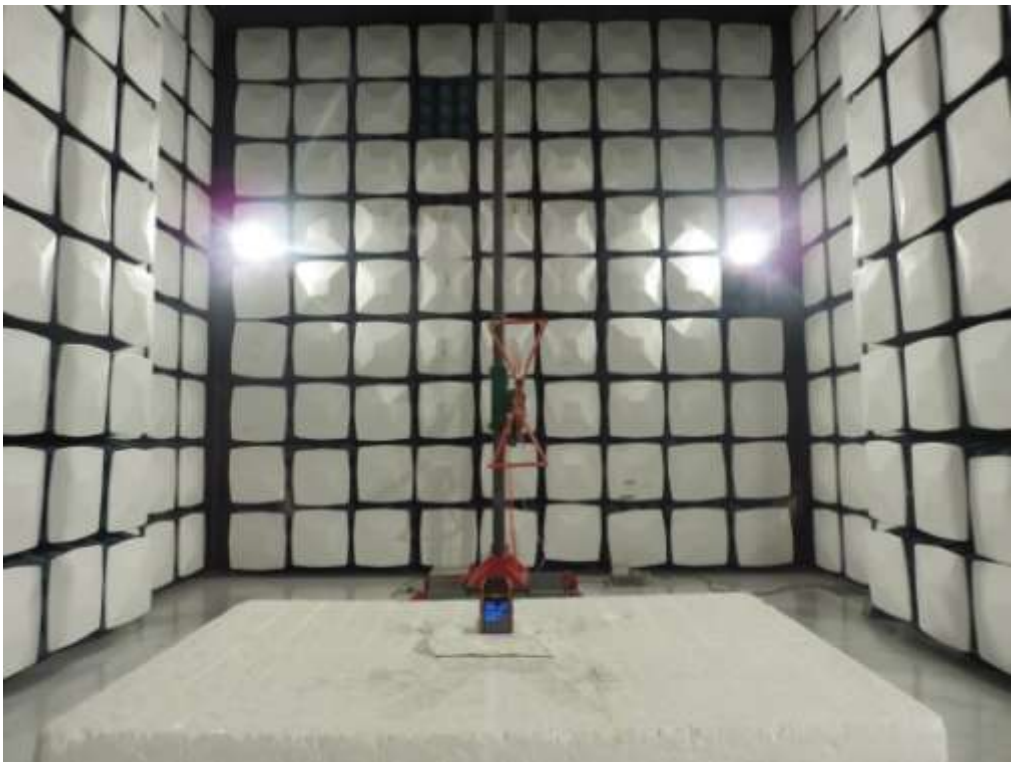


No.	Frequency	QuasiPeak reading	Average reading	Correction factor	QuasiPeak result	Average result	QuasiPeak limit	Average limit	QuasiPeak margin	Average margin	Remark
	(MHz)	(dBuV)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dB)	
1*	0.1500	49.81	31.03	9.78	59.59	40.81	65.99	56.00	-6.40	-15.19	Pass
2P	0.1860	44.22	27.16	9.79	54.01	36.95	64.21	54.21	-10.20	-17.26	Pass
3P	0.2140	40.73	18.44	9.79	50.52	28.23	63.04	53.05	-12.52	-24.82	Pass
4P	0.5380	25.97	16.40	9.68	35.65	26.08	56.00	46.00	-20.35	-19.92	Pass
5P	2.5700	24.01	13.83	9.74	33.75	23.57	56.00	46.00	-22.25	-22.43	Pass
6P	19.4100	25.67	10.67	9.73	35.40	20.40	60.00	50.00	-24.60	-29.60	Pass

APPENDIX A: PHOTOGRAPHS OF TEST SETUP

FCC LINE CONDUCTED EMISSION TEST SETUP

FCC RADIATED EMISSION TEST SETUP

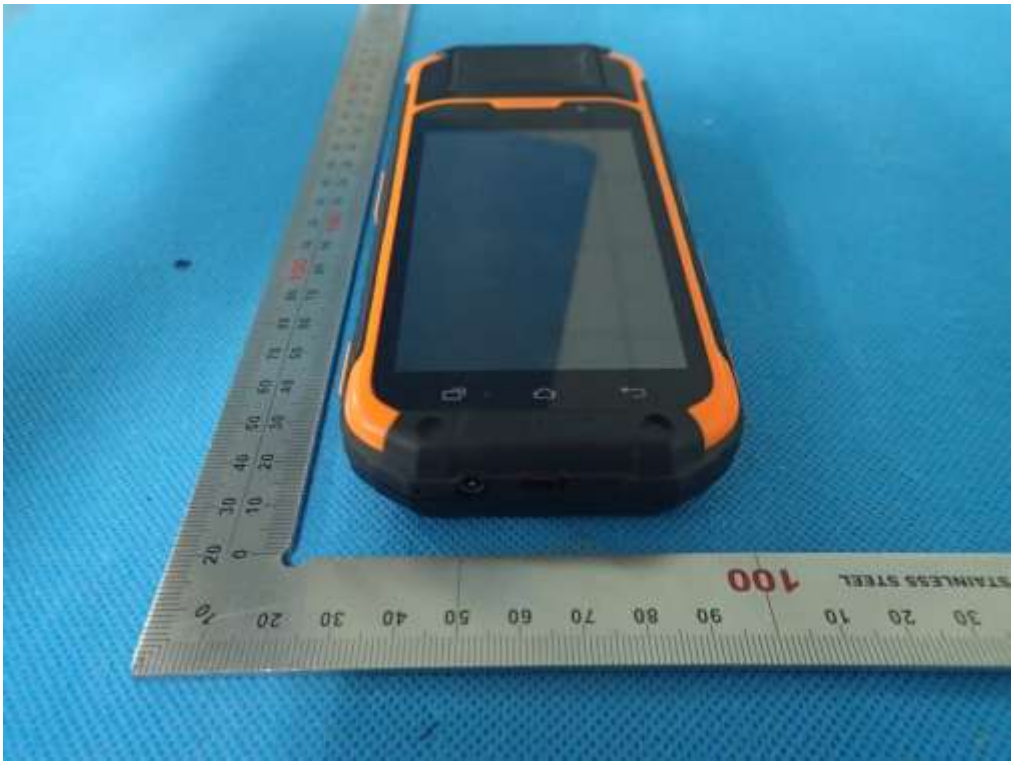


APPENDIX B: PHOTOGRAPHS OF EUT

TOTAL VIEW OF EUT

TOP VIEW OF EUT

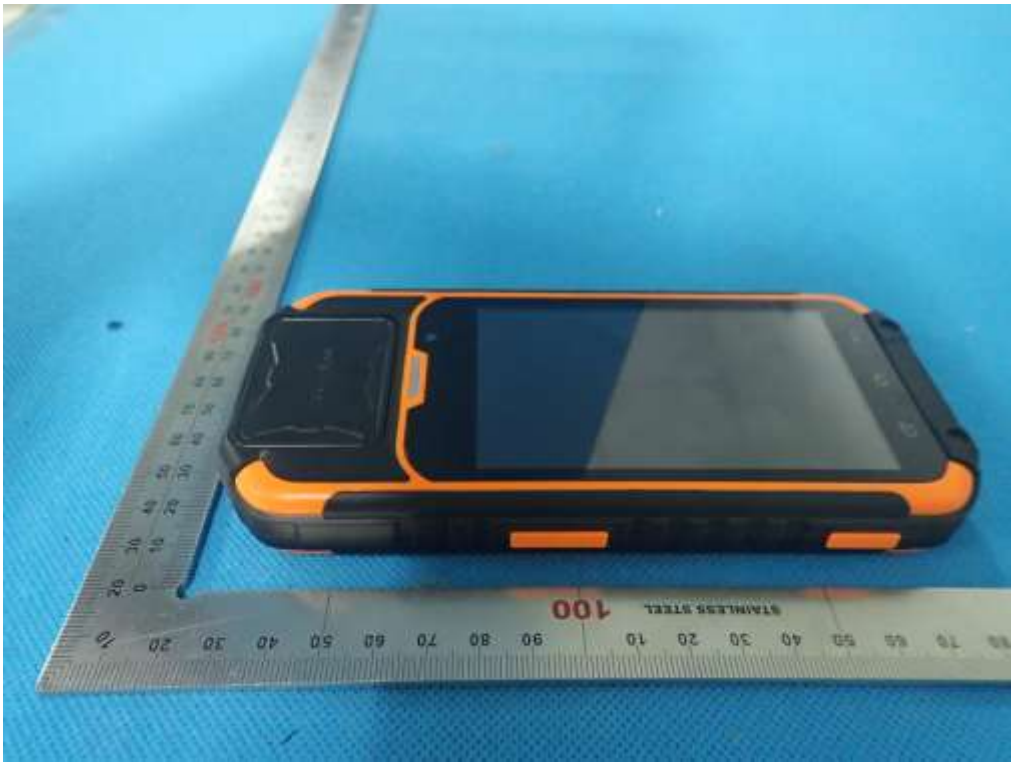
BOTTOM VIEW OF EUT



FRONT VIEW OF EUT

BACK VIEW OF EUT

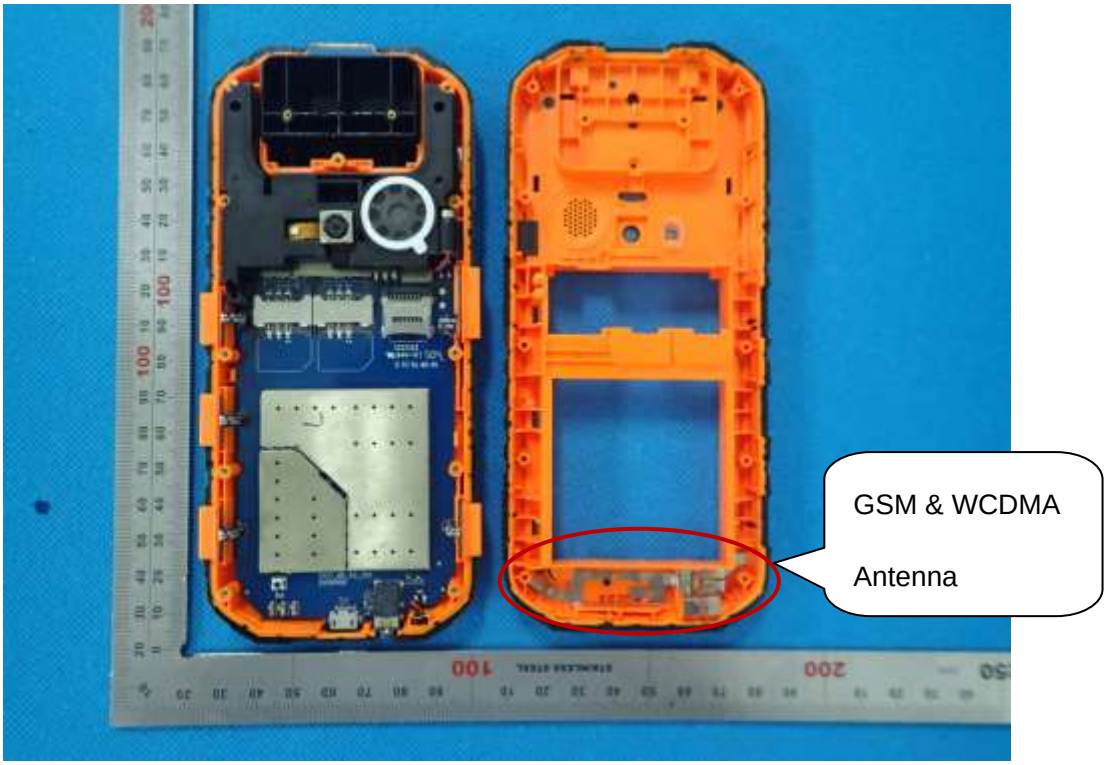
LEFT VIEW OF EUT



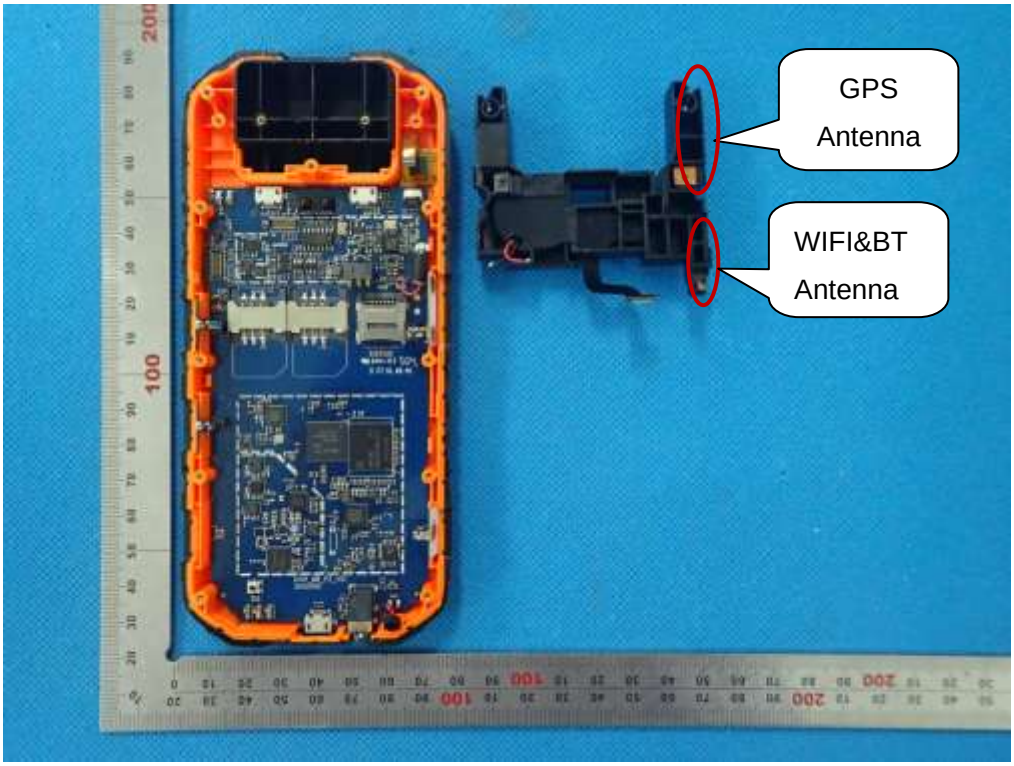
RIGHT VIEW OF EUT

OPEN VIEW OF EUT-1

OPEN VIEW OF EUT-2

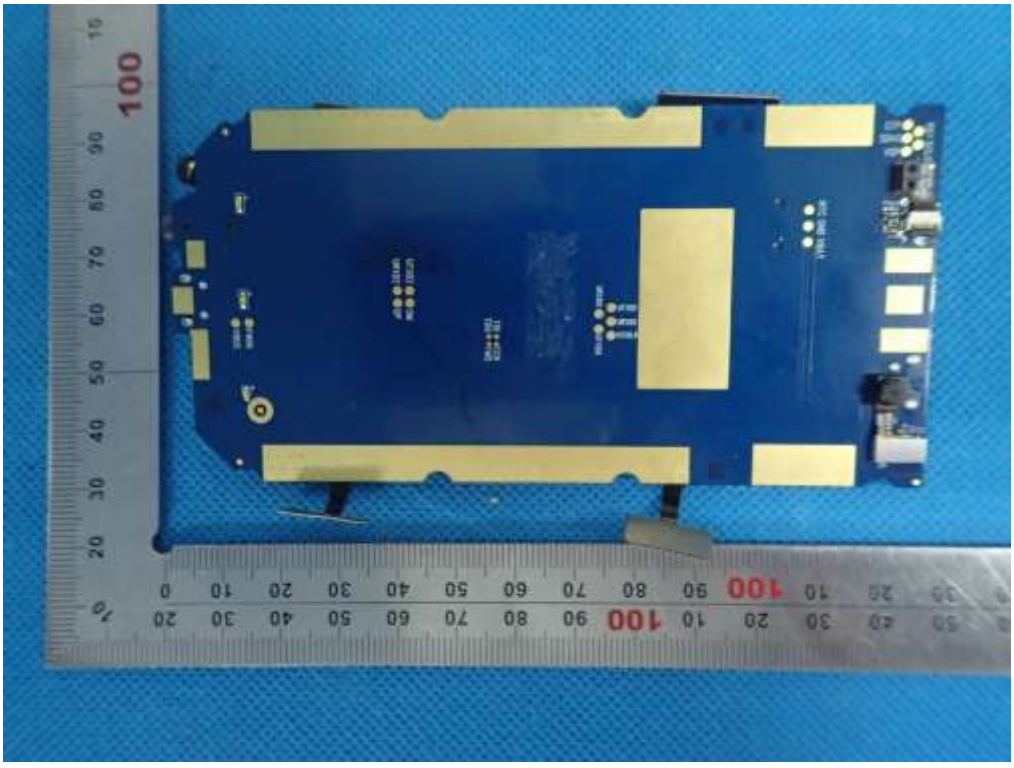


OPEN VIEW OF EUT-3

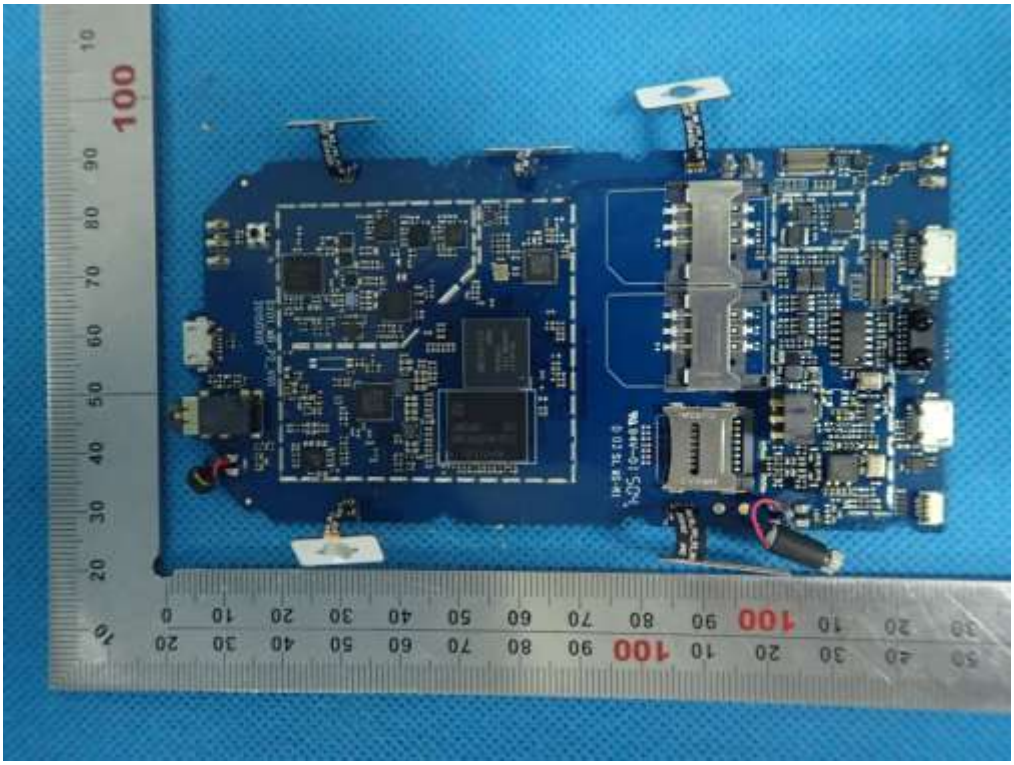


OPEN VIEW OF EUT-4

INTERNAL VIEW OF EUT-1



INTERNAL VIEW OF EUT-2



----END OF REPORT----